Ref 7/F

Unasylva

Volume VIII, Number 2 • June 1954
An International Review of Forestry and Forest Products

MYCOLOGICAL
12MAY1964

A SELECTION OF TWENTY-FIVE PUBLICATIONS FROM THE FIVE TECHNICAL DIVISIONS OF FAO

AGRICULTURE

LEGUMES IN AGRICULTURE. A unique collection of information on the subject with special reference to tropical legumes. ($3.00, 15s).

ZEBU CATTLE OF INDIA AND PAKISTAN. A well illustrated book of interest to all tropical cattle breeders. ($3.00, 15s).

CEREAL BREEDING PROCEDURES. A handbook for the field man and an ideal text for an agricultural college. ($1.25, 7s. 6d.).

SMALL FARM IMPLEMENTS. A short book which has interested the manufacturers of small tools as well as those who give advice on their choice and use. ($0.75, 3s. 9d.).

MILK PASTEURIZATION. An FAO/WHO handbook which is now in use in seminars and colleges all over the world. ($2.50, 12s. 6d.).

ECONOMICS

THE SECOND WORLD FOOD SURVEY. Ran out of print within a few weeks of publication and is now in its second printing – it is a unique collection of facts and forecasts indispensable to anyone interested in the world food situation. ($0.50, 2s. 6d.).

At the end of 1953 FAO published three regional surveys – AGRICULTURE IN ASIA AND THE FAR EAST, AGRICULTURE IN THE NEAR EAST, and AGRICULTURE IN LATIN AMERICA — which analyze the progress made towards the aims of FAO and the prospects for the immediate future. ($1.00, 5s. each).

YEARBOOK OF FOOD & AGRICULTURE STATISTICS, Part I, Production, Part II, Trade. 1953 edition is now available. ($3.50, 17s. 6d. per part).

NUTRITION

FOOD COMPOSITION TABLES FOR INTERNATIONAL USE. After running through three printings in the original edition, these have now been supplemented by a volume on minerals and vitamins. (Price complete $1.75, 8s. 9d.).

SCHOOL FEEDING. The only historical survey of this subject in print and includes practical notes on the running and organizing of school feeding programs. ($1.00, 5s.).

MAIZE & MAIZE DIETS. Follows the FAO short booklet on *Rice and Rice Diets*, the two covering the most important cereals consumed in underdeveloped countries. ($1.00, 5s.).

RICE ENRICHMENT IN THE PHILIPPINES. A scientific report on an experiment in enrichment of rice. ($1.00, 5s.).

TEACHING BETTER NUTRITION. Described as a classic in its field and both English and Spanish editions are in their second printings. ($1.50, 7s. 6d.).

FISHERIES

WORLD FISHERIES ABSTRACTS. In all three language editions an established work of reference. (Annual Subscription $4.00, 20s.).

FAO FISHERIES BULLETIN. Now a quarterly publication with important articles on all aspects of world fisheries. (Annual Subscription $1.50, 7s. 6d).

YEARBOOK OF FISHERIES STATISTICS. The only published comprehensive collection of fisheries statistics on a world scale. ($3.50, 17s. 6d.).

COMMODITY STANDARDS FOR FISHERIES PRODUCTS. A step in the direction of rationalizing international trade in fisheries products. ($2.00, 10s.).

THE TECHNOLOGY OF HERRING UTILIZATION. (published for FAO by Ministry of Fisheries of Norway). The report of an FAO meeting on the subject and a practical handbook of up-to-date information. (14 N.Kr.).

FORESTRY

TROPICAL WOODS & AGRICULTURAL RESIDUES AS SOURCES OF PULP and its companion volume RAW MATERIALS FOR MORE PAPER are technical explorations of the possibilities of increasing the world supply of paper pulp. ($2.00, 10s.).

GRAZING AND FOREST ECONOMY. Covers the general relationship between forests and grazing lands in temperate, tropical and arid zones. ($2.00, 10s.).

ELEMENTS OF FOREST FIRE CONTROL. In its second English printing, lays out the necessary steps for establishing a national fire fighting service and policy. ($1.00, 5s.).

DIRECTORY OF FORESTRY SCHOOLS. One of a new series of reference works being produced by the Forestry Division ($3.00, 15s.).

SEND FOR THE NEW 1954 CATALOGUE OF PUBLICATIONS

Unasylva

An International Review of Forestry and Forest Products

Vol. VIII, No. 2 **June 1954**

CONTENTS

FORESTRY FOR ALL 51
by FAO Staff

POSTAGE STAMPS TELL FOREST INDUSTRIES IMPORTANCE 55
by Berwyn B. Thomas, Research Division, Rayonier Inc. Shelton, Washington, U.S.A.

FOREST GRAZING 59
by FAO Staff

HANDLING TREE SEEDS 66
by Henry I. Baldwin, Research Forester, New Hampshire Forestry and Recreation Commission, U.S.A.

FUNDAMENTALS OF LOGGING STEEP SLOPES 72
by A. Koroleff, Director, Woodlands Research Division, Pulp and Paper Research Institute of Canada, Montreal

COMMODITY REPORT 75
Sawn Softwood

WORK OF FAO
Technical Meeting on Forest Grazing 81
Technical Assistance Activities 82
Near East Poplar Conference 84

EQUIPMENT NEWS 85

NEWS OF THE WORLD 87

SELECTED REVIEWS 94

Cover Photograph: *Forestry can be introduced into almost all school subjects. A teacher at a school in West Virginia, U.S.A., giving instruction to pupils. Background shows art work, leaf collections and essays.* By courtesy of the Soil Conservation Service, U. S. Department of Agriculture.

A CHALLENGE TO INVESTORS

A recent survey entitled *World Pulp and Paper Resources and Prospects*, prepared by FAO in co-operation with UNESCO, ECE, and ECLA, estimates that world paper consumption, which averaged 47 million tons annually from 1950-52, will rise to 65 million tons annually in the early 1960's.

About 13 million tons of this increase will occur in Europe and North America, two regions which today satisfy a substantial proportion of the needs of the rest of the world. Because of this, their surplus production available for export is not likely to grow very rapidly.

Latin America, the Far East, the Near and Middle East and Africa, together with Oceania, now yearly consume about 4 ½ million tons of paper. Of this, over a third is imported from Europe and North America, as well as about half a million tons of pulp. During the next decade the paper requirements of these regions are expected to increase by close on another 4 million tons.

Many new pulp and paper mills are being built or are under consideration in all these regions; but the expansion contemplated in the coming decade only corresponds to just over half the expected increase in requirements.

The need for imports will therefore continue and grow. However, the rate at which consumption can increase in the next few years will be determined not so much by the extent to which increased imports can be obtained as by the pace at which domestic production rises. In the longer term, unless positive efforts are made to encourage expansion of domestic production, lack of adequate supplies of paper may hamper economic advance.

All these regions, with the exception of the Near and Middle East, possess ample resources of fibrous materials already demonstrated as suitable for papermaking. The obstacles to more rapid development are, generally speaking, economic and environmental rather than technical.

The situation calls, therefore, for more specific investigations with the object of encouraging the development of new capacity in favorable localities while guarding against the risk of misinvestment.

Figure 1. — *Schoolchildren plant eucalypts near FAO Headquarters in Rome, on the occasion of 'the last* Festa degli Alberi *(Arbor Day) in November 1953.*

Figure 2. — *Explaining the management of small woodlands to local owners during a community "forest week" of a small town in North Carolina, U.S.A.*

Forestry for All

Promoting Appreciation of a Nation's Forest Resources

by FAO Staff

The Seventh Session of the Conference of FAO expressed the hope that the Fourth World Forestry Congress would be made the occasion for arousing public interest in forestry, and for bringing to as large a portion as possible of the peoples of the world a consciousness of the value of forest resources.

Wood from the trees of the forest is a universal material. It has been called the "material of a thousand uses" but a hundred thousand might be a nearer estimate. It ranks at the top of the all-round raw materials. Yet, throughout history, in almost all regions of the world, man through ignorance, lack of foresight, and often cupidity, has robbed the forest or destroyed the land which rightly belongs to it, and in so doing has not infrequently contributed to his own destruction.

Besides its function as a source of one of the world's most versatile raw materials, the forest constitutes an association of soil, water, plants, and animals all closely dependent one on another. They help both to build and hold together the soil, the humus contributing organic material while the protective tree cover and other vegetative growth checks erosion. Lastly, forests are the natural habitat for many kinds of wildlife, and to man provide retreat and recreation in many forms.

Within the last decade most nations have made a serious effort toward forest, soil and water conservation, as well as the creation of new forests. International action, too, for the first time applied on a really world-wide scale, has begun to bear fruit. But it is essential that concurrently with the initiative and concerted action of professional foresters and all those concerned with forest resources, there should be a movement to educate the public at large, and in particular the youth of all countries, in the economic values of the forest, its influence on climate, water and soil, and above all how it can be conserved most profitably in order to fulfill its multiple purposes.[1]

Adult education

The uses and functions of forests are essential to all, and this may be understood by the few. But it is only when the facts are shown in their living and close relationship to a country's population that they can be truly and generally appreciated. The economic factors are to a certain extent recognized by woodland owners and workers directly dependent on the forest for their livelihood. But even in communities and localities situated near forests, which derive benefit or profit directly or indirectly from them, there is often little or no understanding of the direct link between the condition of the forests and individual prosperity. The all too common tendency is unthinking acceptance of benefits where woodland is plentiful, and elsewhere complacent adjustment to shortages, even where these are avoidable and result only from inertia. These points of view should be replaced by an active appreciation of forest values through the assignment of general or specific responsibilities to government, public and private agencies.

Adult education has to deal with three main classes of people:

1. the forest owner, tenant or operator – that is the individual who is in direct and personal contact with the forest and whose interest lies in turning tree growth into profit, whether tangible or otherwise;
2. the worker in the forest or in wood-using industries who, although dependent on the forest for his livelihood, generally accepts his tasks without great interest or knowledge of their purpose;
3. the great bulk of the population, the general public, whose direct relationship with the forest is tenuous or even destructive, and who does not normally associate the forest with any attributes that affect personal standards of living.

Although it is clear that many governments rightly concentrate effort on schools, where a program of education can be more effectively and lastingly introduced, the stimulation and direction of adult interest should not take a minor place. Until the schoolchildren who have been taught the values of forest resources have grown up to be active and influential citizens, only an adult education program can meanwhile influence the present generation of individuals who are responsible for much of the destruction of a nation's tree cover.

Moreover, many countries already contain groups of adults of varying influence whose interest in these matters has united them into associations working for the protection, conservation and propagation of forests. It is therefore desirable to encourage such public-spirited and often disinterested private agencies by government assistance in the sponsoring of an adult education program, in which they can well be given definite responsibilities.

---

[1] Acknowledgement for ideas is made to Paul W. Schoen, FAO Consultant, and M. Marrou, Documentation Section, Direction Générale des Eaux et Forêts, Paris, France. The United Nations agency primarily concerned with education is UNESCO.

In the main, the problem of adult education lies in dealing with uninformed and uninterested persons. Communities physically associated with forest areas can be reached and their interest aroused by direct appeal; the woodland owner, and the forest or timber industry worker can be swayed by publicity showing the direct effects on their property and their livelihood of wasteful methods of use and forest destruction. But the general public requires more specialized handling; means of arousing interest must obviously vary with the part of the world and the social environment, the type of forest that exists and the kinds of land usage by which certain classes of the population may be affected. Among the categories of people to be reached may be some who regard forest destruction as necessary to their livelihood; an added difficulty in dealing with these is, in many instances, their illiteracy. Education must be simple, clear and intelligible to the average person, even to the illiterate. It must reach the widest possible number of people. Only thus can it offer real hope for the future.

In the education of the public at large, effective action can be undertaken in three ways. In assessing their respective merits, the principal consideration is the degree to which public interest, once awakened, can be kept alive. A number of examples are reported by countries of praiseworthy attempts to awaken interest having been made, only to be abandoned later or allowed to flag through lack of real co-operation on the part of the general public, through a lack of incentive to keep the interest active, or of an inspiring and guiding force fostering a feeling of continuity of purpose.

First, then, it may be the Government that should develop an educational program. The Government presumably possesses a detailed and up-to date knowledge of the nation's forest production and wood requirements, as related to national and international needs. The problems of stimulating popular appreciation of the relationship between the forest and general welfare can be solved by direction and by legislation. But the consequences of adopting only these measures may be negative, and they can seldom be expected to encourage real interest and a sense of responsibility, or foster individual and collective initiative toward the sound husbandry of forest wealth.

Secondly, action may be left to private interests. But this may lead to constructive action only where self-interest or self-preservation offers an incentive. Where a response is aroused it is likely to be only local, and miss the main objective of any such effort, which lies in reaching the maximum number of individuals and organizations.

There remains the third and obvious choice, that of concerted effort by both government and private interests working together on co-operative plans and inviting general participation within recognized spheres of responsibility. This is the strongest line of approach, and the one most likely to lead to success.

The role of government lies in over-all leadership and encouragement toward a desired objective. Such a role, fitting to an agency in full possession of the facts of the problem, avoids duplication of effort which may be inevitable when individual initiative alone is allowed to take the lead. Governments, moreover, are in a position to give encouragement and help in widespread forms — technical, legal, social and financial — and can best bring about continuity of action and of purpose.

Private responsibility in such co-operation begins with ensuring the successful carrying out locally of the general plan and enlisting the maximum of interest throughout all classes of the local community by assignments and division of responsibility. In other words, to private agencies falls the task of local organization and of making the general public receptive to the whole effort.

Tree Festivals

One way of giving focus to a drive towards adult education is to organize tree festivals or arbor days.

It has long been a tradition in many countries to hold annually a tree or forest festival. The origin may indeed date back to antiquity, and be lost in the dawn of religious feeling and awe for what trees represented. Tree mythology, at which we may perhaps now smile tolerantly, may still contain the germ of sound physiology and natural scientific wisdom. Therefore, whatever may be the origin of tree festivals, it is worth turning to good account such manifestations towards one of the objectives of FAO — the conservation and wise use of forests everywhere.

It is of interest to note that the enthusiasm given to the celebration of tree festivals, arbor days or similar occasions, and the thoroughness of measures to ensure the success and permanence of the results of such festivals, are often directly related to a country's degree of awareness of its need for forest resources; or, where such resources are adequate, of the necessity for their protection and maintenance by a public whose sense of responsibility has not yet fully awakened; or finally to the awareness of the situation resulting when recent catastrophe and destruction have been the result of irresponsible action by a section of the nation's population.

Countries which have long recognized that their main wealth is timber, or that their very existence is dependent upon the maintenance of a protective forest cover, have felt less necessity for a special celebration, since the economic and physical values of the forest are learned by all classes of the population from earliest childhood. An example is Switzerland. In Sweden, too, where forests play so prominent a part in the national economy, specific activities are restricted to a Week of the Forest, at a time when a great number of forestry associations hold their annual meetings in the capital, and publicity is given to these reunions and conferences by the press.

There is not space in a paper of this sort to examine the many aspects of the organization of a tree festival as a national celebration and the elements which must be combined to create a communal effort in which every man, woman and child can take a part and find some personal interest. Such an effort each person can remember with pleasure and with some sense of personal pride, with a feeling of having gained knowledge, and of having contributed to the welfare of the community and the nation.[2]

[2] For details, attention is invited to FAO Forestry Development Paper No 2, *World Festival of Trees*, shortly to be published.

Celebrations may be confined to one day only, but it is better that a series of events with similar educational aims be made to lead to a climax over a week-end early in the planting season. Where possible, the tree festival can usefully be associated with the celebration of some national festive occasion, thus giving to it the patriotic aspect it deserves. This advantage has been appreciated by several governments. Many countries also have designated a tree as their national emblem and in both North and South America provincial committees of influential business and professional men are stimulating interest in the native trees by designating local trees as emblematic of their region, after a contest to obtain an expression of preference from the local people.

Alternatively, the celebration can be suitably associated in some countries with religious festivals. Harvest thanksgiving celebrations, including the tree festival as well as flower shows and the activities of wildlife and naturalists' organizations, help to associate in the minds of everyone the role of woodland with that of agricultural and other land uses.

Publicity is an essential prelude to such a festival. This is dealt with in various ways by different countries; the stress is usually, and rightly, laid on publicity through sight and sound media, which are of the greatest value in a wide approach to the people of all classes. Films and radio broadcasts, sometimes complemented by the use of television, are the most generally employed means. But there are many other methods, such as illustrated lectures, posters (the appeal of which can be widened by final selection being made only after a nation-wide or regional competition) automobile emblems, envelope stickers, postage stamp obliterations, postal meter slogans for business firms and organizations with large mailing lists, street decorations and shop window exhibits, special matchbox covers and candy wrappers, and even, as in Japan, a new brand of cigarettes. In another category come the publications and pamphlets on the subject, newspaper articles and press releases; and the sale of buttons and badges, souvenir programs and advertising space within them, the proceeds of which can go toward financing the festival.

Schoolchildren

The organization of tree festivals can also give point to programs of education for young people and schoolchildren.

All this was early realized in the country where Arbor Day, as it is commonly understood today, originated.[3] To quote from an early edition of *Arbor Day*, a bulletin issued by the United States Department of Agriculture:

> " under the direction of (the) Superintendent of Schools . . . the schoolchildren of the city had a prominent part in the celebration, which included a parade through the streets to Eden Park, where trees were planted in memory of distinguished men. About 20,000 children participated in the singing and reciting and in putting the soil about the trees, which had already been set in place. Two new elements were introduced into the Arbor Day plan on this occasion — the day was made a school festival and the practice of planting memorial trees and groves was inaugurated. "

Such developments were largely responsible for the spread of the movement throughout the country, and the occasion became a festival for schoolchildren combining utility with instruction and pleasure, and served to impress the value of trees and the need for conservation on the minds of the young.

Laws throughout almost all the United States of America relating to Arbor Day now include mention of schools. To cite an example, the provisions of the laws of Arizona state:

> " The authorities in every public school shall assemble the pupils in their charge on Arbor Day and provide for and conduct, under the general supervision of the State superintendent of public instruction, such exercises as tend to encourage the planting, protection, and preservation of trees and shrubs and an acquaintance with the best methods to be adopted to accomplish such results and shall cause trees to be planted around the school buildings with appropriate and attractive ceremonies. "

In many other States, Arbor Day is a holiday and educational officers and teachers are required to have the pupils observe the day by the " planting of trees or other appropriate exercises ". As a variant, a list of school holidays includes Arbor Day provided it is observed " for the purpose for which it is designated by the Governor and Council ".

In many countries, schools have taken an active part in tree-planting ceremonies organized by governments. In the case of city schools, or where school grounds are fully planted or unavailable, the ceremonies may take the form of avenue or street planting, or the adorning of parks, memorials and entrances to public buildings in urban districts. In rural communities, planting activities may be more extensive and range from roadside planting to village firewood plots, shelterbelts, school forests or watershed and soil protection schemes. In some countries, as for instance the United Kingdom, the need for a broader scope is recognized and the national forestry authority, in this case the Forestry Commission, as well as providing the seedlings for Arbor Day planting ceremonies, also allocates plots of existing forest in various stages of development to schools who " adopt " them and are responsible for their care and maintenance. Such a system offers all-the-year-round opportunity to schools or to smaller units within the school, such as clubs and Scout groups, for forest activity.

In Iceland there is a Students' Afforestation Day Act by which tree planting is made compulsory on one day a year during school term and at a time when afforestation conditions are favorable. The planting is under the control of a competent foreman and in the vicinity of the school. Other provisions are also made in cases where the conditions in a given locality are not suitable.

[3] Arbor Day, as such, grew out of conditions peculiar to the Great Plains in the United States, being first observed in Nebraska in 1872. As in many other countries since then, hopes were vested in public institutions, agricultural societies and individuals who would carry out tree planting. Prizes were offered to those who planted and secured the survival of the greatest number of trees.

The sense of responsibility and the interest can be much greater if, either through government grants (as for example in Victoria, Australia) or by raising funds by an appeal to parents and friends, a school can procure land close by, and make it the children's responsibility to reforest or plant the area. In Spain, plantings on Tree Day are being replaced by School Forest Plots.

All facets of woodland development and care should under these circumstances be taught, from seed collection and nursery work, to land preparation, planting, and the care and protection of young trees; and for the older boys as they grow up with the trees, initial thinning of their plots, mensuration and utilization. The economic value of the forest can certainly be brought home to the older children when they have had a hand in the actual marketing of the produce from their school forest.

Schools, whether secular or religious, are the only organized institutions which have a lasting influence on almost every individual making up a nation's population; impressions gained from teaching, precept or example during the earliest formative years of a child's development last to old age.

Forestry and the care of woodland should, therefore, become a regular feature of a school curriculum [4] and Arbor Day take the form of intensive planting by the entire school at the onset of the planting season. Lack of knowledge by teachers can be made good by qualified state foresters assisting and supervising the work, and forestry can be integrated in the more normal routine of lessons as a topic of almost every subject taught; in spelling and writing, literature, languages, mathematics and even music, in addition to botany, biology and allied subjects of natural science, geography, drawing and woodwork.

The school forest can become a recreation ground and an open air classroom, and achievements in both planting and care, the collection of forestry material, or drawings, and writings in prose and poetry, in which the tree is the subject, can be stimulated and rewarded by nomination to a forestry club, where the strong appeal of badges, pins or buttons as awards can be fully exploited. Boy and Girl Scout organizations, often an important school activity, can also participate, especially during holidays, in the care of the school forest and of the nursery [5].

Where school magazines are exchanged with other schools, articles and reports, drawings and photographs on the subject of the school forest can appear and may do much to encourage other schools to begin a similar scheme.

Where urban schools cannot either adopt or own their school forest, a partnership between an urban and a rural school can be arranged, the city school providing the funds, for instance, and the country school doing the work and supervision of the area. Visits by the city school, especially on Arbor Day when the children can participate in the planting, can be of tremendous value in developing not only the forest but the interest of town dwellers in the subject for which Arbor Day is designed.

Arbor Day for children and adults alike can and should be the culminating point of a year of achievement and the beginning of another year of working together and looking forward to a better world. It appeals to the spirit of youth and carries with it the inspiration to work together toward the betterment of the community, the nation and the world.

[4] In Arkansas, U.S.A., the study of fire prevention is included in the course of study in the primary grades of all public schools, " and definite instruction in said subjects shall be given to each pupil and student therein, and a period of not less than 20 minutes during each scholastic week shall be devoted to the study and consideration of said subject ". Authorization is also given to adopt textbooks to be used in the teaching and study of fire prevention. California sets a date for the observance by schools of conservation, bird and arbor day. Its observance will not constitute a holiday " but by including in the school work of the day suitable exercises having for their object instruction as to the economic value of birds and trees and the promotion of a spirit of protection toward them and as to the economic value of natural resources, and the desirability of their conservation ". Boards of school trustees and city boards of education are empowered to conduct courses in forestry, acquire forest land by lease of purchase, afforest or reforest and plant trees, shrubs and vines on these lands or any public lands placed at their disposal, and transport pupils to places where forestry work is being done and practical demonstrations can be held.

[5] In India, government and state shields are annually awarded to educational centers, as well as to adult communities, for meritorious activities in forestry. In Italy, prizes are awarded to children who have given particular attention to the care of trees, and tours are arranged to observe the results obtained in other areas and in previous years.

Postage Stamps Tell Forest Industries Importance

by Berwyn B. Thomas

Research Division, Rayonier Inc., Shelton, Washington, U.S.A.

Few people, probably, would think of the Post Office as a good place to advertise, but when it chooses it can be one of the best. It offers the advertiser an attractive, low-cost, mass-produced medium, frequently used by everyone and widely distributed throughout the world. What is this advertising medium? The postage stamp.

Illustrations used on postage stamps are generally of persons or scenes significant to the countries which issue them. Often, these have dealt with forests and forest industries – the story of the occurrence of trees around the world, the methods of harvesting them and the uses to which they are put, and the need for conservation and improvement of the forests (Figure 1).

A collection of postage stamps based on this theme was prepared originally for display at the annual Forest Festival at Shelton, Washington, which in 1953 celebrated the centennial of logging in that area. In its mounted form the collection includes about 180 stamps. Representative groups of these stamps are shown with this article, and this written commentary is intended to describe their significance.[1]

The Theme

Trees around the world — uses of wood — conservation

Depletion of the natural resources has been much discussed in recent years. Modern civilization demands manufactured goods, chemical products, and food at an ever-increasing pace. Yet our resources of oil, coal, minerals — even the soil — when once used or dissipated can never be replaced.

Throughout history forests have been among the greatest raw material sources. Trees have been a necessity of life for fuel, tools, shelter, and for their fruits as food. Modern technology has added paper, fibers, chemicals, and other uses for wood, and still more developments can be expected in the future. Because of the diversity of its applications, wood has been called the " universal raw material ".

Yet history also records great nations which have grown rich on the wealth of their forests, only to dwindle when the trees were gone and the bare land ruined by erosion. The timbers of the Lebanese cedars built the Temple of Solomon, but little remains of them today. China once had extensive forests but is now swept by recurring floods from the eroded earth left bare by their removal.

If this is not to happen again — if wood is truly to be the universal raw material — the growth of forests must be maintained equal to the rate of use, and the best and most useful trees must be made to grow as rapidly as possible. The conservationist and the botanist say these problems can be solved, and much has already been done, particularly by the pulp and paper industries. One of the essential factors in the attainment of the goal is public recognition of the problems and co-operation in working out solutions.

[1] This article is published by courtesy of *Pulp & Paper* – The Management and Production Journal of the Pulp and Paper Industry, Chicago, Ill., U.S.A. ; Photographs are by W.J. McCleary.

Figure 1. (a) *100 tree species are shown in stamps – this is from French West Africa;* (b) *wood use illustration – a pulp and paper mill in Canada;* (c) *conservation of forests promoted by Japanese stamp.*

Figure 2. (a) *Western pine, U.S.A.*; (b) *spruce in Black Forest, Germany;* (c) *forests of Finland;* (d, e) *African jungles;* (f) *Araucarian pine;* (g) *mango.*

Figure 3. (a) *Baobab;* (b) *palms;* (c) *cedar of Lebanon;* (d) *The Charter Oak;* (e) *bamboo;* (f) *Tree of Panama,* Sterculia apetala; (g) *Giant Kauri;* (h) *pitch pine.*

Figure 4. (a) *Oak – strength;* (b) *olive — peace;* (c) *palm — honor;* (d) *an oasis;* (e) *sprouting stump representing rebirth of defeated nation, Italy 1946;* (f) *clearing for colonization in Delaware;* (g) *Japanese plum;* (h) *Yugoslavian scene.*

Forests and trees[2]

General forest scenes have been pictured on stamps by countries in the Americas, in Europe, Polynesia, and Africa. In much of Asia large forests are a thing of the past, and their absence is reflected in the scarcity of postal forest pictures.

It has been estimated that nearly 100 species of trees can be identified on stamps, though many others of unknown species have also been pictured and many appear frequently. These include pines, cedars, palms, oaks, mango, mahogany, labuan, the acacia and baobab of legend, and bamboo, which is often used as timber. The distribution of tree types over the world is evident, too. Palms abound on stamps from the tropical countries, especially the Pacific islands, and softwoods on issues from the temperate regions. Hardwoods are more generally distributed.

A few individual trees have been made famous in history, such as the Charter Oak, the historically similar Proclamation Tree of Australia and the great Tree of Panama. Cuba has especially honored its Tree of Fraternity.

Certain species of trees have acquired symbolic qualities through traditional use, such as the olive branch of peace, the laurel of victory, the palm of honor, and the oak of strength. Some of these appear in Figure 4. Another symbolism for which trees are used is the sprouting of a new shoot or planting of a seedling to represent the birth or renaissance of a nation. This has been used postally by Germany and Czechoslovakia in 1919 and by Italy in 1946.

In the desert regions trees make oases, where life is possible. In the colonization of America, on the other hand, dense forests had to be removed to make way for settlements.

Trees planted in ornamental gardens or avenues have been pictured on many stamps, such as those of Japan and Yugoslavia. Poems about trees have been recalled by stamps, and Russia has reprinted in full color paintings by famous artists which show trees in fields and forests.

Since living trees yield many prominent agricultural products, there are numerous stamps picturing all kinds of fruits, chicle, rubber, coffee (" The coffee of El Salvador is the best in the world ") and other products. These are touched on only lightly in this collection as they are outside its primary purpose.

---

[2] Figures 2 – 5.

Logging [3]

Turning now to cutting of timber for use, we find numerous postal illustrations of the steps in this process. Several European countries have shown the woodcutter at work with axe or saw. Italy has depicted the sawing of planks with the old-style pit saw.

Nigeria, the Cameroons and British Honduras have all shown the felling of trees from elevated platforms, but their practice differs from that of the Pacific Northwest in that the platforms extend around the tree and are supported by poles. Mahogany is one species cut in this manner. Newfoundland over 40 years ago showed a group of lumberjacks standing in their camp at Red Indian Lake, while a 1949 Canadian stamp pictured the use of portable power saws.

Methods of handling logs which have been pictured postally include ox teams in the Newfoundland snow, hand labor, and elephants in the teak forests of Burma. Truck logging appears on a new issue from British Honduras, while Yugoslavia suggests rail transport. Rafting of logs in rivers is a very popular subject; at least eight countries in Europe, Africa, and tropical America have shown river runs ranging from single logs to great rafts bearing their own crew huts.

Figure 5. (a) "*Field of Rye*", *painting by Shishkin, U.S.S.R.;* (b) *tapping rubber trees;* (c) *coffee;* (d, e) *woodcutters;* (f) *use of elevated platform;* (g) *use of power saws.*

Figure 6. (a) *Ox team in Newfoundland;* (b) *hand labor;* (c) *elephants with teak logs;* (d, e, f) *river runs of logs;* (g, h) *primitive housing and tools.*

Wood utilization [4]

The uses of wood which are shown on or suggested by postage stamps are indeed innumerable. Primitive weapons, fuel, tools, and shelter were largely wooden, and many such uses continue today. One of the largest uses of wood is for lumber in housing and other construction. Many wooden buildings have been shown on stamps. A recent United States commemorative stamp shows the old frame home at Oyster Bay, New York State, of Theodore Roosevelt. A Polish stamp shows the stark charred beams of a bombed-out building after the blitzkrieg of 1939, while Austria depicted wooden scaffoldings in a reconstruction issue. House furnishings, also, are largely wooden.

Other major wood-consuming fields are the transportation and communication industries. In these fields postage stamps have pictured wooden ships, stage coaches, covered wagons, early airplanes and gliders, railways ties, freight cars and wooden packing cases. Several early woodburning locomotives and ships have also appeared.

Figure 7. (a) *Home of Theodore Roosevelt;* (b) *ruins of Warsaw, 1939;* (c) *reconstruction, Austria 1947;* (d) *furnishings of Lenin's study;* (e) *stagecoach;* (f) *glider construction;* (g) *The Mayflower.*

[3] Figures 5 and 6. [4] Figures 6 – 8.

Figure 8. (a) *Wooden cars and crates;* (b) *wood-burning locomotive:* (c, d) *telegraph and telephone poles;* (e) *paper mills, Grand Falls. Newfoundland;* (f) *40th anniversary of the Press Association;* (g) *Third World Forestry Congress, Finland – a pulp mill;* (h) *literacy campaign.*

Figure 9. (a) *Textile industry;* (b) *automobile tyres;* (c) *view of Pearl Harbor from Japanese planes;* (d) *Japanese alcohol monopoly;* (e) *Carl von Linné (Linnaeus);* (f) *Botanical Gardens, Rio de Janeiro;* (g) *Arbor Day in the U.S.;* (h) *Italian festival of trees.*

Pulp and paper [5]

Next there is the manufacture of pulp and paper, which in 1952 consumed 26,500,000 tons of wood in the United States alone. The United States, however, has never directly recognized the industry postally.

On the other hand, the first paper mill in Newfoundland, built by British interests at Grand Falls, was shown on a Newfoundland stamp of 1910. The Corner Brook mills have also been shown on the issues of 1930-1949. A Finnish stamp honoring a forestry conference showed a pulp mill.

Canada, in 1952, issued a striking stamp to advertise its leading industry (Figure 1b), which might be said to portray the neatest job of continuous delignification of wood into paper that has yet been devised.

Paper itself has been recognized postally in the anniversaries of early printing presses, famous books, the Press Association, and the famous newspaper publisher, Joseph Pulitzer. The availability of wood-fiber papers in the past century has made possible the rapid rise in literacy and the spread of knowledge among the peoples of the world. In fact, it may be considered responsible for the large number of stamp collectors and the great profusion of stamps issued.

Derivatives of wood [6]

Other large quantities of wood are more highly refined to chemical cellulose. Some of the uses of this product which are found on postage stamps are rayon for the textile industry and auto tyres, photographic film, plastic objects and explosives.

The waste liquors of the sulphite pulping process are a great potential source of future chemical products. One of the best developed uses for waste liquor is its fermentation to ethyl alcohol. An alcohol still and the formula C_2H_5OH have actually appeared on a Japanese stamp.

Conservation [6]

Finally there are stamps representing that part of the theme–conservation–which is so necessary if all the demands of the foregoing uses of wood are to be met. Carl von Linné, or Linnaeus, the first great systematic botanist, has been pictured by his homeland, Sweden. Botanical gardens have been established to study and display the growth of trees and national parks to preserve samples of virgin growth for future observers. Such gardens and parks have been shown on stamps by the U.S., Russia, Japan, Brazil and other countries.

Public interest and assistance in programs of reforestation and forest management are encouraged by several means with postage stamps. Arbor Day, established in the United States in 1872, was commemorated by a 1932 stamp. Similar issues have appeared as promotion in Japan (Figure 1c), the Philippines, the Ryukyu Islands, and Italy. The future rural owners and farmers of the United States have been trained in conservation or forest management by the Boy Scouts and Girl Scouts, the 4-H Clubs, and the Future Farmers of America. All these organizations have been honored by recent commemorative stamps.

In addition to postage stamps, the United States Government has given postal aid to conservation through use of the slogan — "Only YOU can prevent forest fires" — in the cancelling machines of many post offices. Some postage-meter slogans have been seen, especially from European sources, which include symbols and publicity for forestry and wood-using industries.

This, then, is the story which is told in the world's stamps — the availability of wood and its unique properties have brought it into wide and diverse use throughout the world. These uses will increase, and the supply must be guarded and maintained, for *there is no other renewable raw material for all our future needs.*

[5] Figure 8.

[6] Figure 9.

Forest Grazing

Principles of Management

by FAO Staff

A Technical Meeting on Forest Grazing, held in Rome from 29 March to 3 April, is reported later in this issue. This paper was prepared as one of the background documents for the Meeting.

In most countries both trees and forage are important but there is not enough of either resource to satisfy all needs. Therefore, in considering forest grazing, the need for a type of management which will permit the production of wood products as well as forage should be kept in mind.[1]

Accepting the production of wood products as a prerequisite, forest grazing management will have the following objectives:

1. a high production of desirable forage species on a sustained yield basis in so far as site and growing conditions will permit;
2. maintenance or rehabilitation of soils in a stable and productive condition, which will permit the high production of forage plants;
3. high yield of animal products based on ample forage supplies.

Basic to such high production are the following facts:

(*a*) The animal is the end product of the process of forest range management and to produce well the animal must have an abundant supply of nutritious forage. At the same time, the animal must be of a breed and kind that is adapted to the conditions of the range and will make the most economic and efficient use of the forage available.

(*b*) Plants are complex living organisms requiring an ample food supply to grow vigorously and abundantly from year to year. Their growth requirements must be respected and the plants must be carefully guarded against abuse.

(*c*) The soil is the source of food for the plants and provides the medium in which plants grow. To produce abundantly the nutritious forage plants required by grazing animals, the entire soil complex, the physical structure, the micro-organisms and the organic matter must be protected.

In this combination of soil, plants and grazing animals with which we must deal in forest grazing management, primary attention should be given to the welfare of the soil and the plants. Without soil and forage plants grazing animals cannot exist, and it is a well-established fact that, wherever there is an abundant supply of nutritious forage growing on a stabilized soil, the production and growth of the animal will, under a program of good range management, take care of itself. This, of course, is disregarding the effects of insects, diseases and other factors which may affect animal production.

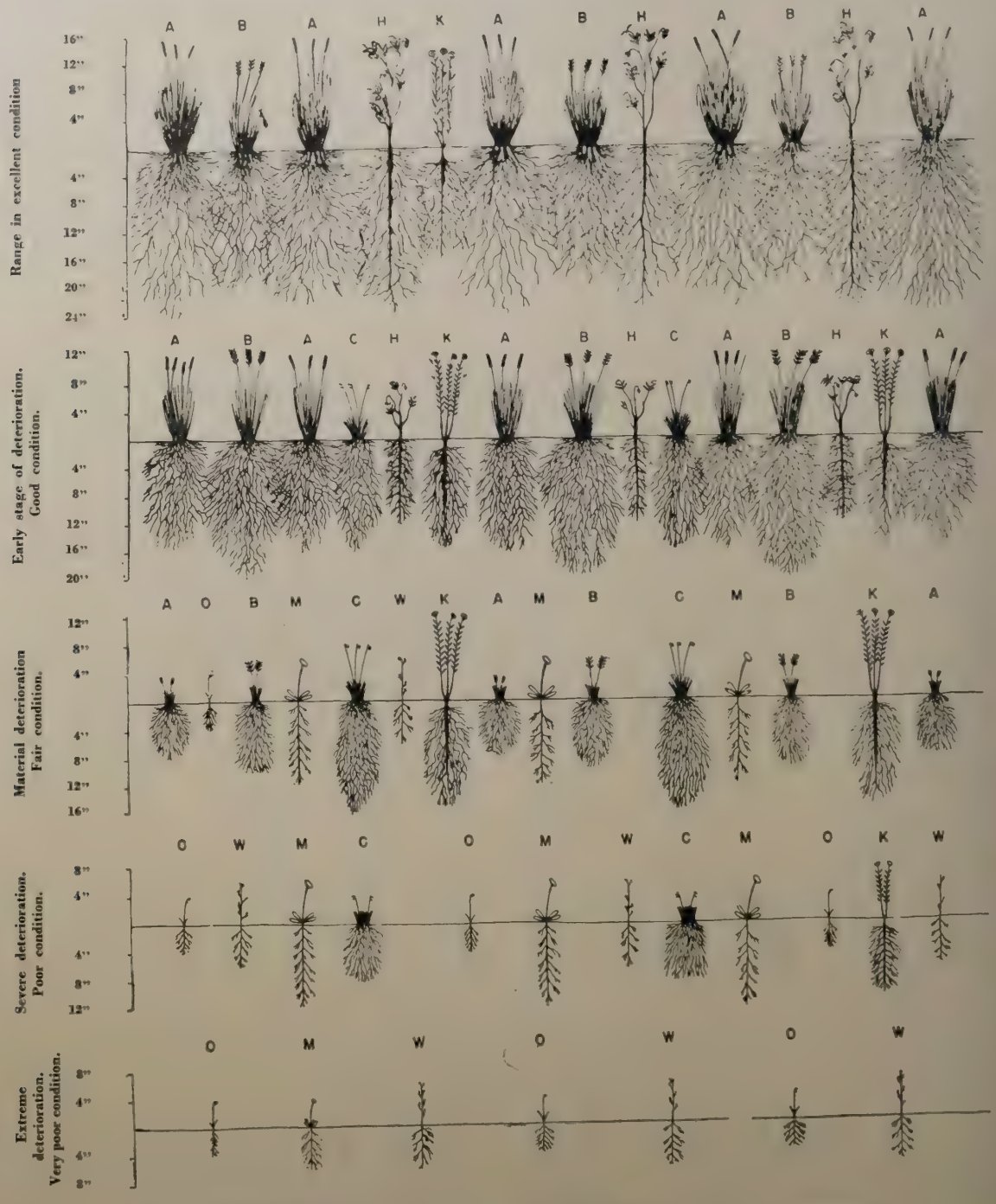
Forest ranges which can be described as in good condition are producing close to their optimum of nutritious forage because most of the precipitation which falls is readily absorbed by the soil; and the soils on those ranges are able to give their best to plant growth. This in turn is reflected in high animal production. But if the animal begins to abuse the plant through, for example, overgrazing or continuous grazing during critical growth periods, the plants lose vigor, their roots begin to shrink, eventually they die and are replaced by species inferior for grazing. In the meantime, the soil, no longer adequately protected by a plant cover or firmly held by a thick mass of roots, begins to wash or blow away; thus moisture and nutrients needed by the plants and by the grazing animals are lost and so the yield of forage and animal products is reduced. Unless corrected, the process of deterioration will continue, faster and faster.

Many of the forest ranges of the world are in some stage of deterioration. To improve the ranges and their productivity through grazing management requires exactly the opposite process from that just described. Plants must be permitted to accumulate sufficiently so as to check the run-off of precipitation and to return litter and organic matter to the soil. As the soil improves, the density and volume of plants improves and, in turn, the production of the animal increases.

The level at which ranges can be expected to produce forage, animal and forest products and the rate at which they can be expected to recover from their depleted condition under improved range management depends a good deal upon the climate in which they are found. There are some major differences in climate which affect the growth and use of forest range forage and which are important in appraising forest range practices.

[1] See also *Grazing and Forest Economy*, FAO Forestry and Forest Products Study No. 4, 1953.

FIGURE 1. — RANGE DETERIORATION



Semi-arid temperate zone

Forest grazing has probably been more successfully practiced, and for a longer period of time, in the semi-arid temperate zone than any other major climatic area of the world. The native forage produced in the zone is nutritious and it retains its nutritive qualities so that it is well-suited for livestock production. Animal diseases and insect pests generally do not present serious problems.

This zone is characterized by considerable fluctuation in seasonal temperatures and relatively light annual precipitation. In some parts, precipitation may be concentrated in winter and early spring while other parts may receive summer rainfall. In many cases, there is a prolonged dry period each year and sometimes, if normal precipitation fails, drought and the resulting shortage of forage becomes a serious problem in range management and livestock production. Emergency supplies of forage are desperately needed in such cases to save livestock from starvation.

This limited precipitation produces rather open forest stands, and tree growth is relatively slow. Beneath the trees, however, there is considerable herbage growth quite suitable for use by livestock and game. In the warmer parts of the winter precipitation area the vegetation grows from late autumn to early spring. The summers are hot and the vegetation is dried and of little grazing value. However, in the colder parts, some of the precipitation may come as snow, and growth of herbage does not begin until spring melts the snow and warms the soil. Growth is made over a relatively short period in late spring and early summer and the forage remains nutritious into late summer. Summer rainfall of course produces summer growth of forage which is usually best grazed during summer and autumn, although on some ranges yearlong grazing is practiced.

There has been much abuse and deterioration of forest ranges in the semi-arid temperate zone and they are not producing as much forage or livestock products as they could and should. In addition, the yield of wood products is often impaired and watersheds are in a critical condition. Improvement in grazing management is needed.

Humid temperate zone

In this type of zone, moisture is not usually a limiting factor in the growth of forests and herbaceous vegetation. In many cases, the favorable growing conditions produce rather dense stands of hardwoods, or a mixture of hardwoods and conifers, and the amount of herbaceous and shrubby vegetation is limited. The tree reproduction of many hardwood species is palatable so that livestock using these forests often do damage to the trees. Inasmuch as game animals are usually present, most of the forage produced is needed for them, but even with game grazing damage occurs when numbers exceed the forage supply.

In some parts of the warmer belts of the zone, a more open growth of coniferous forest permits a heavy growth of grass and other herbaceous vegetation. It is possible that repeated fires may have maintained this condition in some cases and certainly the heavy understory vegetation presents a fire hazard unless removed. During the growing period, this vegetation is reasonably nutritious but soon afterwards it drops below the nutritive level for maintenance of the livestock and must be supplemented. Grazing seldom removes the bulk of the herbage produced, so that good growing conditions must often be maintained by burning during moist periods of the year. Under such a system, great care must be exercised to protect the more valuable and palatable species from abuse, either from grazing or fire.

A third situation found in the humid temperate zone is represented by the alpine and sub-alpine pastures. They are found in high altitude, cool belts where precipitation comes mostly in summer and the vegetation grows through much of the summer. These are often intensively managed ranges, interspersed with the forest, and cannot be used at other times because of snow and cold. The forage remains nutritious throughout the summer and provides excellent grazing primarily for herds of dairy animals.

Humid tropical forests

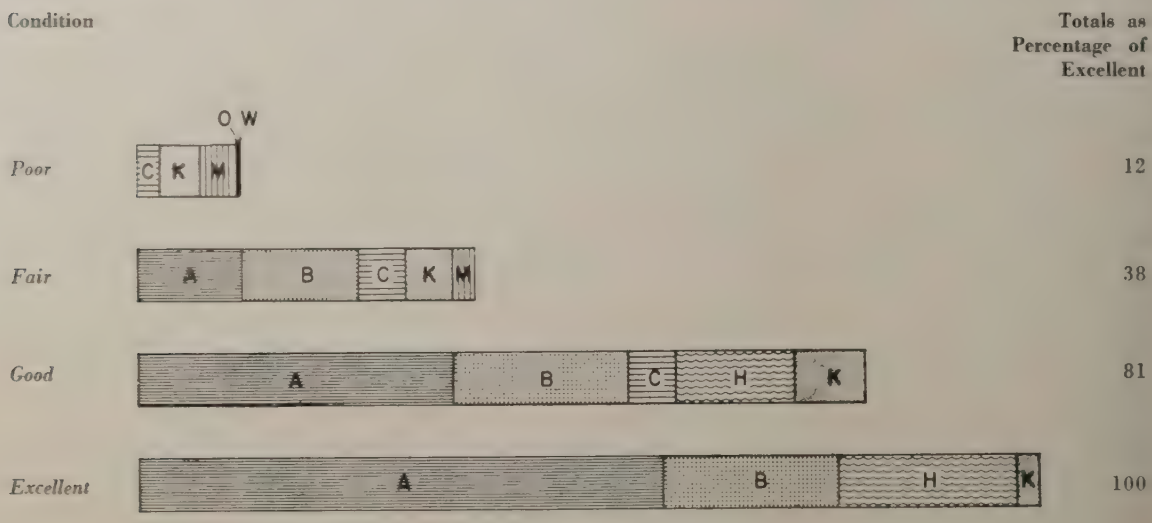
In the humid tropics there are two major forest grazing situations, the heavy tropical forest and the savanna forest. Rainfall may be fairly heavy yearlong or the pattern may be about six months of heavy rain, during which time the herbage is produced, with the other part of the year quite dry. There is little or no grazing in the heavy tropical forest except after the trees have been thinned or felled so the land can be grazed or cultivated. Even then, many of the grasses which become established are not good forage species and there is always a struggle to keep trees from recapturing the land. Periodic burning is needed to maintain the grass, but when fire is not wisely used soils and sites deteriorate markedly.

The savanna forest produces a grazing situation very similar to that found in the warmer parts of the temperate humid zone — a heavy growth of grass and other vegetation but with rather low nutritive quality other than during the growing season. Here, too, fire has played, and continues to play, an important role in maintaining this grassland aspect and in keeping the vegetation reasonably usable by livestock.

Arid tropics

The arid tropical parts of the world range from sheer desert to a scattered tree-savanna and in no case is an abundance of herbage produced. Precipitation occurs over a rather limited period and during the remainder of the year it is very dry. Herbage growth, of course, occurs when there is sufficient moisture and since this may vary from region to region, a nomadic type of grazing is practiced. Water for livestock is very limited so that some parts of the range are used only occasionally with perhaps some additional game use.

FIGURE 2. — FORAGE FURNISHED BY DIFFERENT PLANTS ON AN IMPROVING RANGE



BALANCE OF NUMBERS WITH GRAZING CAPACITY

This is probably the biggest and most serious problem of forest range management in many parts of the world today. The scant forage production, the poor development and low production of animals, the catastrophic periodic starvation losses of livestock, particularly during periods of drought, and the serious erosion of soil by both wind and water, all join in stark testimony to this lack of balance of numbers with grazing capacity. In addition, many countries do not produce sufficient crop-land forage to offset the range, and that which is produced is often considered too valuable to feed to range livestock.

Grazing capacity is defined as the ability of a range unit to give adequate support to a constant number of livestock for a stated period each year without deteriorating with respect to this and or other proper land use. This definition implies a balance between forage and number of livestock but does not mean much in range management unless there is a reasonable knowledge of what constitutes the forage supply. It should first of all be clearly understood that not all vegetation that grows on a range is forage. The amount of forage a plant can furnish depends upon such things as the preference of animals for it, its edibility or palatability, the amount of herbage which must remain on the plant to produce sufficient plant food, and its ability to withstand grazing.

A desirable forage plant must be able to compete under grazing with other forms and species of vegetation and to provide a protective cover of vegetation and litter to guard the soil against erosion and to rebuild sites that are deteriorated. Strong seeding habits or the ability to spread vegetatively are desirable in forage plants as is a large root system which can withstand wide variations in soil moisture and temperature and trampling by livestock.

The management of a range, however, and the balancing of numbers of animals with grazing capacity cannot be based on individual plants alone but rather on the aggregate of all the forage-producing vegetation. It is true, however, that particular attention should be given to certain key species which furnish a large part of the forage and which must be maintained in high vigor in the stand or which, on ranges in deteriorated condition, it is desirable to increase. These plants should not be grazed beyond their safe limit even though there appears to be considerable ungrazed herbage remaining on the range.

Grazing capacity should not be assessed to include heavy utilization of the less desirable plants because under such a practice the more desirable and palatable plants will be overgrazed and killed off. Considerable herbage from ungrazed or partially grazed plants, left on the ground, is important in maintaining or rebuilding good soil and watershed conditions. Physical and biological deterioration of the soil, brought about by a lack of balance between numbers of animals and the forage supply, reduces the production of both forage and animal products. Other good range management practices cannot offset the effects of too many animals.

In some parts of the world, particularly in semi-arid zones, years of severe drought, when precipitation is

considerably below the average, cause scant forage production, severe overgrazing and loss of livestock on the range. Droughts are a part of the weather pattern in such areas but it is impossible to predict when they will occur. Therefore, in order to be entirely in balance with grazing capacity, numbers of livestock should be somewhat below what the range could graze in an average year, so as to permit accumulation of a reserve of range feed to be available in a drought year. To offset further the effects of drought, reserves of hay or other supplemental feed should be available to carry at least the breeding herd through the drought period. Sharp reduction in numbers through quick sale of lower quality animals is sometimes necessary.

If, as stated, the animal is the end product of forest grazing, attention must be given to the vigor of individual animals, the number and frequency of progeny, and the death losses from starvation and other causes.

In the United States, several different research studies have shown that, when numbers of cattle are in balance with grazing capacity, more beef is produced and a higher dollar return realized per animal than when close grazing is practiced. Similar results have been obtained with sheep and angora goats. In many countries, nomadism and lack of unit area supervision makes control of numbers of animals difficult. In those cases, some more adequate means of range management such as allotment of certain areas to individuals or groups may be needed.

It should be recognized that big game, deer, [illegible] which graze in the forest constitute a definite part [illegible] grazing load and they should always be included [illegible] numbers of animals are being considered for balance with the forage supply. It should also be recognized that numbers of game animals increase continually and unless they are systematically controlled through hunting or other harvesting methods, they can cause major problems of overgrazing and range deterioration.

Forest values, are, of course, also affected by too many animals but if numbers are in balance with the forage supply and the right kind and breed of animals is being used, the forest values will usually not be seriously damaged by grazing. It is recognized, of course, that certain kinds of trees such as carob, for example, are highly valuable for fodder purposes as well as for wood and can logically be considered a part of the forage supply.

Most Effective Seasonal Use of Forest Ranges

In most grazing areas of the world, some form of seasonal grazing of the ranges is practiced. High mountains are grazed in summer because snow and cold prevent their use at any other time of year. Desert shrub areas which receive only winter precipitation and produce their forage crop in winter are generally grazed in winter, as they are exceedingly dry and bare in summer. The foothills in between are used in the

Figure 3. — *Cattle grazing on extremely overgrazed forest range in Iran. This type of use has resulted in low forage production, a degraded forest cover and poor quality, unproductive livestock. Better control of livestock and the application of sound range management practices are required to increase the production of wood products and forage on forested ranges of this kind.*

By courtesy of Carocci Buzzi

spring and autumn as the livestock move from the low winter ranges to the mountain summer ranges. Such seasonal migrations are logical and, in fact, necessary.

From an animal nutrition standpoint, the green growing season is the most desirable time to use the forage but in order to plan most effectively for the use of these ranges, consideration should be given to the development and growth requirements of the plants which are most important in the forage supply. The most critical time for removal of the herbage is when the seed-stalks are forming on the plants. Grazing at this time, which is sometimes at the beginning of the summer dry period, means removal of food developed and temporarily stored in the leaves which would normally move to the roots for storage to start the next year's growth. Lack of soil moisture may prevent further growth and production of food material for storage. The management of the range should be planned so as to avoid grazing the same range area year after year at this critical time. Periodic total deferment during this period is desirable. Light grazing early in the season and moderate grazing after maturity of the forage crop will usually maintain the range in good condition.

Many countries could be cited to illustrate the problem of seasonal use and the kind of management which might be desirable to protect and improve the productivity of the range. Certainly, the principles have more or less universal application. For example, in parts of the western United States, there are broad inter-mountain valleys where precipitation is very light and occurs mainly in winter in the form of snow while summers are extremely dry and most of the vegetative growth takes place during the early spring. These ranges are used by either sheep or cattle during the late autumn, winter and early spring. It has been found through research that in order to permit the desirable forage plants to make satisfactory growth, to replenish stored food supplies and to provide seed, grazing during the early spring when the vegetation is making its growth should be restricted to alternate years. This requires that the range be divided into two parts for alternate spring use and that slightly more range must be provided for winter grazing.

The spring range usually lies at the intermediate elevations and the growth period may be somewhat later than on the winter range. Ordinarily, livestock will be using the range during the period of active growth. Here there is great value in a system of deferred and rotation grazing wherein the range may be divided into at least two use units which may be grazed at different times during the spring grazing season. The unit grazed early in the season one year may be grazed late in the season another year so as to avoid any particular unit being grazed during the most critical part of the growing season each year. In many instances, these same ranges may be grazed again in the autumn during the migration to the winter range, so a reserve of forage for use in the autumn should remain at the end of the spring grazing period.

Forage growth on the high altitude summer ranges is still later and livestock graze them many times during much of the growing period. These are usually areas of rather heavy winter precipitation and high soil moisture in early spring, so grazing should be avoided until the soil has become firm and is no longer liable to be trampled or puddled. Plants on the summer range need the same consideration with respect to their growth and development as on the spring-autumn range. Since the summer grazing season often extends considerably beyond the end of the growing season, there is real opportunity to protect plants during the growing seasons on part of the range each year through some system of deferred and rotation grazing.

In some of the high mountain areas of Switzerland, France and Italy, administered by their respective Forest Services, where summer-long precipitation is common, the growth of grasses continues throughout most of the 3 to 4 months' summer grazing season. These pastures are fertilized with manure from the milking shed, and forage production is high. The forage is used similarly to that of cultivated pastures in that the grazing is heavy enough to keep the young green growth available throughout the entire season. Most of these grasses are sod forming, so seed production is not important in the maintenance of their forage production.

In the humid tropics and the warmer parts of the humid temperate zone, the only time the forage can be used to advantage is during the growing season, because its nutritive values become so low at other times. In such humid areas, grazing during the growing season is not as serious as in drier climates because growth is usually much greater than can be utilized. However, the grazing season can sometimes be extended beyond the growing season by the addition of such a protein concentrate as cottonseed meal. The greatest danger lies in overgrazing the important forage species when there may be abundant herbage of less desirable species still remaining on the range.

Kind of Livestock

Broadly speaking, the kind of livestock grazed on a range should be that which can make most profitable use of the forage produced and still protect the other values of the land. Grazing habits and forage preferences vary widely between the various kinds of animals but a particular species of animal has about the same habits regardless of where they may be found. Goats, deer and camels prefer shrubs, trees and other woody types of vegetation and are often referred to as browsers. Goats, particularly, will eat almost any kind of vegetation, but they are often forced to eat many plants in quantity which they would not normally graze. They also use a considerable volume of grasses and other herbs, especially in the spring when such plants are green. In grazing management they are best used on ranges which have an abundance of shrubby plants where it is desirable to keep the amount of brush cover in reasonable balance with other forage so that the land can be used by other livestock, if desired.

When wood for fuel and other forest products are highly valuable on the forest range it is usually best to use animals which do not have preferences for woody types of vegetation. Cattle, buffalo and horses prefer grasses and other herbaceous types of forage. They browse only from necessity and at certain times of the year and often do rather poorly on brush ranges. Sheep and elk also prefer the herbaceous types of forage although in the winter months, when the nutritive values of such vegetation are low, they graze considerably

on woody species. It should be emphasized that, with domestic livestock, the breed is fully as important as the kind of livestock using a range. It is not sufficient simply to choose to graze cattle, but if best results are to be obtained a particular breed of cattle must be chosen which is adapted to the conditions of the land where they are to graze. Kind and breed of animal used will vary by conditions of climate, insects, diseases, etc. This is especially important in tropical areas.

Hogs use mast to advantage during short seasons and can be grazed if timber trees are not susceptible to damage. They sometimes injure the roots of certain conifers.

Reasonably Uniform Use of Range Forage

On many ranges, part of the problem of overgrazing is caused by the concentration of animals around watering places, bed-grounds, milking sheds, and in the moist green valleys where the forage may be more succulent and fresh. In reverse manner, there may be parts of the range at a distance from water or otherwise unattractive which could furnish more forage than at present. On many ranges it is virtually impossible to obtain exactly uniform use everywhere but if the over-all number of animals is in balance with the grazing capacity of the range, it is possible to bring about considerable improvement by applying some basic range management practice. To do an effective job it is important to know the characteristics of the range and something of the grazing habits of the animals using the range.

Poor distribution of animals may be due to poor distribution of water for the livestock; rough topography; the presence of so-called sour grass in some parts of the range; the practice of returning flocks or herds to the same central camp night after night; poor control and herding of livestock while grazing on the range; or to concentrations of use caused by trailing, flock migration or nomadism. Not all of these problems of distribution are present on all ranges, in all countries, or all climatic zones, but some of the following practices may be useful in helping to solve them wherever they exist.

1. Develop new watering places for livestock on the range. The principle of scattering livestock in small groups should be kept in mind. Even small watering places which may last only a short time during the grazing season are important.
2. Place salt and other minerals which may be deficient in the range forage at strategic places to attract animals into grazing areas normally avoided because of rough topography and other factors.
3. Deliberately herd animals into lightly grazed areas, particularly during times of the year when water and other necessary facilities for grazing animals are available.
4. Practice "bedding-out" or penning in the back country to avoid the effects of trailing to and from the bedding at central camps. The establishment of small, temporary, intermediate camps where the herds are kept only overnight or at most a few days will relieve the main places of concentration.
5. Avoid concentrated movements of livestock such as trailing from one seasonal range to another by planning the grazing and progressive movement of the animals.
6. Improve the palatability of sour grass by prescribed burning and mowing to keep new growth available on the plants. In order to protect the soil and other resources, burning must be well-planned and carefully done during moist periods of the year.
7. Install fences and other range facilities such as milking sheds and shelters for better control of livestock movements. Fences are particularly valuable for dividing ranges into units for control of seasonal use and in implementing plans for deferred and rotation grazing.

An important and basic part of range management is control of livestock and game on the range, so that they will utilize the forage in the most efficient manner possible consistent with the welfare of the forage producing plants and soil. It is emphasized again that, even though the animal is the end product of range use, forage plants and the soil are the basic resources which must be zealously guarded and protected.

Simultaneous Use for Grazing and Forestry

A type of grazing management which will guard and protect the forage and soil will also protect the timber and watershed values. With the exception of the hardwood section of the temperate humid zone, grazing and forestry on the same land are quite compatible. In most instances, grazing can continue even under a program of forest range rehabilitation, but the management must be sound and in harmony with requirements of soils and plants to strengthen and rebuild themselves. Grazing can serve to protect the forest by reducing the amount of inflammable material and thereby reduce the fire hazard. Grazing may also aid in the establishment and release of tree reproduction.

All of this, however, does not alter the fact that many forests of the world are virtually unproductive because of the extreme pressure from grazing animals. Before these forests can again be made productive of either wood products or forage, better range management practices must be initiated. In some instances the forest may need to be replanted if there is not a reliable source of seed of desirable species remaining in the old stand. In either event a period of total protection from grazing may be required to give the new stand a chance of establishment.

Better range management in the forest cannot be accomplished simply by talking about it. A country may first need to develop or adopt a definite grazing policy. The policy may have to be supported by legislation and an administrative organization with the power to enforce needed reduction in numbers of livestock, particularly of certain kinds which may be harmful to the forest trees, and make a start toward proper seasons of use. In the meantime, people must be convinced of the necessity and value of such a program so that they will co-operate in its execution. Without the backing and co-operation of the users of the land, forest and range improvement is indeed difficult.

Handling Tree Seeds

by Henry I. Baldwin
Research Forester, New Hampshire Forestry and Recreation Commission, U.S.A.

There is an increasing interest in many countries in the expansion of tree-planting programs. These programs may involve, first of all, small experimental trials of species not yet grown in these countries and, secondly, plans for large-scale afforestation or reforestation programs with species proven by test to be successful for the purposes desired.[1] *This article is an extract from a technical study, later to be published, prepared for FAO on collecting, extracting, cleaning, testing, storing and shipping tree seeds, and on practical arrangements for their exchange internationally.*

All plans for obtaining tree seeds must include decisions on the kind and quantities of seed wanted, geographic source and race or variety, and how the seeds are to be collected, extracted, cleaned, tested, stored and shipped. Details of import and export permits, quarantine inspection, and payment can usually be left to the commercial dealer or collector from whom the seeds are to be purchased.

Procurement of Tree Seeds

Certain records are necessary in all cases. Certificates of origin and seed quality should be obtained from collectors or dealers, or official seed testing stations, where they exist. Records of special collections need to be made, and should be kept identified with the seeds throughout the course of processing, shipment and ultimate use. To be of any value the records of origin must be maintained when the seeds are sown in the nursery or directly in the field, and for ultimate plantation.

Source of provenance

All forms of life exhibit variation in natural populations, some to a greater degree than others. Evidence of variation in trees of the same species has been accumulating, especially during the present century, so that many different geographical races have been distinguished and generally accepted in hundreds of tree species, and suspected in others. Trees that have a wide range, including areas differing in climate or soil, may quite probably exhibit differences even if these are not apparent. The literature on this subject is very extensive. Data on any given species generally can be obtained from the country of origin.

Many countries and minor subdivisions have special laws or regulations aimed at insuring reliable certificates of provenance. As a result of the Sixth Session of the FAO Conference in 1951, Member Governments agreed to the principle of seed certification, and a standard form was developed. This record of origin should be adequate to provide the information necessary to permit later collections or importations to be duplicated. It should be filled in as completely as possible, and a file maintained of the disposition of each seed lot so that every plantation can be identified with the record.

[1] See also "Introduction of Exotic Trees – Dangers from Diseases and Insect Pests". J.S. Boyce. *Unasylva*, Vol. VIII, No. 1.

Certificate of quality

Before purchasing, storing, shipping or sowing any seeds, the viability or capacity of the seeds to germinate and produce plants must be made available. Dead seeds that have lost viability are worthless, and seed lots, only a portion of which are viable, are obviously of less value than where a high percentage is capable of germination. Since seed of low viability requires denser sowing in the seedbed in order to secure a seedling stand of optimum density, the expense of shipping poor seed should be avoided. Knowledge of viability requires testing by some means, preferably tests of germination.

Since seeds are sold by weight and shipping costs depend on weight, freedom from foreign matter such as bark, leaves, cone scales, tree wings and other appendages, and other kinds of seeds is also very desirable, because it affects the value of the seed lot per unit of weight. Moreover, danger of importation of insects and diseases is greatly increased by foreign matter, such as particles of soil. For these reasons, reliable seed dealers use great care to clean seeds.

Germination and purity are the two most important factors in seed quality, and are both commonly determined for seed tests for a certificate of quality. The reputation of a seed dealer depends on such certificates and will often decide his success in obtaining and keeping customers. In the process of purity determination the weight of 1,000 seeds is easily calculated. This is useful since it is a measure not only of the quality of the seed crop of the year but also as a check on origin, as some provenances are characterized by differences in seed weights.

Consignment form

The third record is merely a designation of the sender and destination to which the seed is sent. The sender may or may not be the collector or dealer. This form is for use by the quarantine inspection, postal and transport agencies and customs officials. Its purpose and use are self-evident.

Inspection certificate

Many countries have no import quarantine regulations to protect against introduction of plant pests. Others accept the certification of a foreign government that the seed is free from pests; and still others refuse

to accept any certificates but carry out their own disinfection and inspection.

Where inspection service is available to exporters of seed the seed should be so inspected and certified, since entry into the importing country will be thus facilitated. Import permits are required by many countries.

Collection of Tree Seeds

Details of collection methods of various species may be obtained from many texts, pamphlets, and reports published in many countries. These should be consulted before initiating collecting operations. General principles only can be mentioned here. It is necessary to know the location of seed supply, whether a crop is to be expected in the year collection is to be made, and the time of maturity, before arrangements can be made to collect seeds. Transport of the seeds and how they are to be stored, packaged, and protected in the process also require planning.

Locating seed supplies

Seeds are borne only by trees that have sufficient maturity, and in most species there is an optimum age of seed bearing. Crops increase in volume and quality up to a certain age and then fall off with increasing age. Seeds from trees just beginning to bear are often of poor quality. Trees for seed collection should be of good form, if the seeds are destined for timber production, to avoid danger of undesirable genetic qualities. However, open-grown trees produce more abundant seeds and, if adjacent trees in dense stands are of good form, they may safely be used. Similarly, trees whose poor form is due to mechanical injury may also be used.

Unless a region is already well-known, scouting will be the first step, in order to locate stands of sufficient maturity and of a character capable of seed production and having desirable form. In some countries considerable progress has been made in developing and reserving for collection seed orchards of so-called "elite" trees.

Determining abundance of seed crop

Seed crops of trees that require more than one year to mature their fruits may be forecast by observation of the abundance of immature fruits; in others the nature of the flowering earlier in the season can be used as an indication. In any case, examination of the seed collection area in advance of the maturity of the seed crop is necessary. Since many species set really good crops at intervals of several years, seed crop reports over a period of years are valuable in estimating the occurrence of crops.

Estimating maturity of seed crop

Knowledge of the condition of fully mature seeds of the species is essential. Then the average date of maturity in the given region should be known. Appearance of the cones or fruits is helpful but not always reliable. Samples should be examined to see if the seeds are well filled out. Contents of immature seeds are often "milky", the seed coats are soft, or the seeds are not fully grown. Specific gravity tests for the cones of many pines have been found accurate in determining maturity. The seeds of some trees are shed soon after maturity, so that collection should begin early rather than late where the collection period is short. Experience indicates that mistakes are most often made by waiting until too late in the season. Storing by squirrels and other animals is often a good indication of the best time to begin collection.

Methods of collection

When many seeds are borne within a large fruit, or cone in the case of conifers, the entire fruit is usually collected. Small seeds as in birches and poplars may most conveniently be gathered by clipping off small twigs and branches with fruits attached. Large seeds from trees such as oaks and hickories can be gathered from the ground. Collection from standing trees is usually more time-consuming than from the ground or from felled trees, but can often be made from the tops of trees felled in logging operations provided the trees are felled at the proper stage of seed ripeness.

Various tools have been adapted or developed to facilitate cutting cones, fruits and twigs from standing trees. Ladders and climbing irons are also used. Where squirrels and other animals hoard seeds, such *caches* can sometimes be located and collection greatly simplified. Methods vary in different countries depending on tradition, labor conditions, topography and the nature of the seeds to be gathered. They range from simple hand-picking, often by children, to the elaborate machinery used by commercial walnut-growers.

Special conditions

Harvesting the seed crop is a regular operation in many public forests. Taking seeds from private or public forest lands requires the owner's permission. It is also well to find out if other collectors use the area proposed so as to avoid unfortunate conflicts. Transport of fruits or cones to extracting plants may involve quarantine restrictions to prevent spread of insects and diseases. All these factors should be thoroughly cleared well in advance of the time of collection.

Storage of fruits and cones after collection

Green fruits and cones, especially those of fleshy character, tend to heat or ferment a few hours after gathering if they are kept in compact piles or sacks. They should be kept as cool as possible. Sometimes spreading out on large pieces of canvas is practicable in dry climates. Good aeration is essential. Seeds that cannot withstand drying should of course be protected. Perishable seeds can be packed in the manner in which they are to be stored and thus shipped from the place of collection.

Packaging Tree Seeds for Shipment

Experience has shown that more consideration should be given to methods of packing tree seeds than has been customary in the past. Loss of viability has been traced to exposure to high temperature and varying humidity in transit. Some seeds require preservation in dry

conditions, others moist, but nearly all are unfavorably affected by high temperatures and great changes in temperature.

Temperature

Little can be done to control the temperature during transit, short of refrigeration which is expensive and rarely necessary. Sensitive seeds should be shipped by air whenever possible, since they are less liable to be exposed to heat and are in transit a shorter time. Stowing near steam pipes in ships, railroad trains and warehouses is to be avoided whenever possible. Freezing can injure seeds with high water content. Seeds are, of course, less liable to damage from heat and freezing than other plant parts. Some protection can be given against temperature by insulating packing.

Moisture

Packing can eliminate most if not all danger from moisture changes. Sealed containers and modern plastic materials furnish means of packing seed so that any given moisture condition can be maintained during storage and shipment.

1. *Seeds that should be kept dry.* This category includes most conifer seeds, stone fruit seeds and many light-seeded species. Many of these keep best when dried to a very low moisture content. It is, therefore, necessary only to dry the seeds to the optimum moisture content and store them in sealed containers. Small samples may be shipped conveniently in strong jute paper envelopes enclosed in larger strong paper envelopes. Packages sent by air are in little danger of encountering high humidity. A better method is to enclose the seed envelope or cloth bag in a bag or wrapping of polyethylene film that is sealed air-tight by use of a hot iron or by closing the mouth of the bag with a stout rubber band. Many such bags are now on the market for use in shipping fruits, vegetables and other plant parts. This plastic film has the advantage of permitting passage of carbon dioxide but not water vapor. Seeds packed in this film have been kept two or three years in a high humidity chamber with practically no increase in moisture content.

Another method consists in enclosing the paper envelope or cloth bag in a wrapping of aluminum foil attached to heavy kraft paper. The foil is coated with a plastic and can be sealed by use of a hot iron; the right temperature must be used.

Very sensitive seeds can be maintained at an accurate moisture content by enclosure in a plastic, glass, or other sealed jar containing beads of silica gel that maintain the seed at a fixed moisture content. The jar can be opened repeatedly without disturbing the moisture equilibrium and seed can be separated from the beads by screening: such containers should be packed in substantial boxes to withstand crushing.

In fact, all large packages of seed should be given outside protection to prevent crushing that might burst the plastic bag or cause mechanical injury to the seed itself. Sometimes a strong cloth bag outside the plastic bag will be enough, but large packages should be boxed and protected by soft packing material which, incidentally, acts as insulation against temperature changes.

Large bags of seeds, 100 pounds (about 45 kilograms) or more, are regularly being shipped from seed dealers in one country to dealers abroad, enclosed simply in an outer canvas or jute bag carefully sewed up. Such shipments appear to travel satisfactorily, but there are often no checks made of the germination before and after shipment. If the moisture content of the seed cannot be controlled at the time of packing, bags permeable to air are probably to be preferred to air-tight covering.

The outside container should in any case be strong enough to withstand rough handling. Thus cardboard cartons and boxes made only of plywood often arrive crushed and broken. Such containers should be reinforced inside with a stout wooden frame.

Small packets should always be enclosed in a larger bag and not placed loosely in packing material where they may be lost during quarantine or customs inspection.

Since seeds may have to undergo fumigation before shipment or on arrival at destination, it is important that they should not be sent in too large quantities in any one container: that would impede penetration of the fumigant as well as airing after fumigation.

Dry-stored seeds should be in the best condition as to moisture content when packed; the package and the air in the package should be dry. Packages should be kept in cool dry rooms while awaiting shipment and during transit. Shipments should be timed to reach the destination just before the time of sowing.

2. *Seeds that require moist packing.* These include seeds of oak, chestnut, silver maple, magnolia, holly, rose, palm, and many other large seeds. They should be well-mixed with pulverized sphagnum moss, ground

Figure 1. — *Growth of air-cargo shipping offers new opportunities for quick transport of sensitive seeds over great distances. Loading a ton of Douglas fir seed in the U.S.A. for shipment to Europe*

Courtesy of Roger Dudley, Seattle 1, Washington

peat, coconut fiber or sawdust, that has been moistened and squeezed dry. (A mixture of equal weights of dry packing and water will give adequate moisture content to these materials). *Hevea* seeds are often shipped in powdered charcoal.

After thorough mixing with the moist packing material the seeds should be placed in water resistant containers. Here again polythylene plastic has been found the most suitable material since it maintains moisture, while allowing the seeds to breathe, so minimizing the danger of heating. Although this plastic is expensive, it can be re-used several times if carefully handled. Tests have shown that moss packed in this film can be kept moist for a year or more with no addition of water. If this material is not available, waxed paper or other waterproof wrapping should be placed around the package and the whole placed in a stout canvas bag, or in a box that can give outer protection.

Seeds that are prone to germinate when held in moist packing may be treated with an inhibitor such as maleic hydroxide.

It should be emphasized that the quantity of seeds or plant material shipped in one container often has an important influence on the condition in which the material arrives. Even with seeds packed in polythene bags, those with small quantities per bag often endure transport better than larger quantities in one package.

Large seeds like walnuts, hickories and acorns can be shipped satisfactorily in cool weather, if dried slightly on the surface, and then shipped loose in open boxes or cans or in loose sacks.

Coating large seeds to prevent water loss

A method that has been found successful in preserving in moist condition during shipment the seeds of certain, but not all, species requiring this treatment, is to coat each individual seed with paraffin. This is especially useful for seeds that will not tolerate drying, yet tend to germinate if moisture is maintained. The following method has been used at the Arnold Arboretum in the United States of America:

(*a*) Keep seeds at room temperature a few hours before treating.

(*b*) Heat and maintain parowax to 71-77° C (23-25° F) in an adequately large container.

(*c*) Place seeds in a screen-type container (such as a wire-basket used for holding test tubes). The seeds should be only one layer deep, and loose enough so they can roll around easily.

(*d*) Shake the screen vigorously, keeping the seeds in rapid motion while dipping them for a moment in the hot wax. Continue shaking after removal until wax turns white and hardens on the seeds.

(*e*) Toss the seeds out on a piece of waxed paper. As soon as the wax has hardened the seeds are ready for shipment. Unless the seeds are very cold the whole immersion process should require only a few seconds.

(*f*) The waxed seeds must be packed in ground cork, dry sphagnum moss, sawdust or other filler, so the wax will not be scraped off during transit.

When the time comes to sow the seeds, the wax must be partially scraped off in order to admit water more freely.

This method was found to be very satisfactory for shipping *Quercus alba* and *Q. montana* and less so with *Castanea pumila* and *Aesculus parviflora serotina;* but even in the latter two species there was a marked superiority in keeping viability over other methods of shipping.

Various latex preparations have also been used for the prevention of water loss in seeds and other plant parts during shipment. Coatings that crack or peel are unsatisfactory. A strip-coat or dip in ethyl cellulose gives a resilient, easily removed coating.

General instructions

The selection of a packaging medium for a given lot of seed depends upon the quantity to be shipped, the length of time the seeds will be in transit, and the temperatures and moisture conditions to which the shipment will be exposed. The conditions under which the seeds have been stored up to the time of shipment influences the choice of packing method.

Cool dry shipping. If shipment is by airplane, or train or truck in cool weather, moisture-proof wrapping is not required for most seeds if travel time does not exceed two weeks. Paper packets such as strong jute envelopes are suitable for small samples; double cloth bags loosely packed are better for larger quantities.

Maple and oak can be sent in this manner in small quantities only. Large quantities should be divided into small lots for shipment.

Fluctuating temperature or moisture. Under such conditions, the longer the seeds are in transit the greater is the danger of moist seeds drying out, or dry seeds absorbing moisture. Conifer seeds should be dried to optimum moisture content and packed in moisture proof wrapping. Moist-packed seeds should also have moisture-proof wrapping to protect against water loss.

Air shipments of hermetically sealed seed run the risk of exploding at high altitudes, unless the container is extremely strong or the seeds are vacuum-packed. It is best to have the containers as full as possible, so that there is the least possible air in them.

In spite of all precautions it happens frequently that some shipments come through in good condition, while others, packed in the identical manner and sent by the same carrier, become spoiled in transit. Chance still plays a role. Packages may be piled against a steam pipe on shipboard or on railroad or they may be allowed to freeze, while other more protected locations in the freight escape such extremes. Sometimes packages that are delayed or that may lie over for several days in a freight or express office experience extremes of temperature not encountered en route.

Wrapping materials — moisture proof

Metal foil:

heat-sealed aluminum foil; aluminum foil-backed kraft paper; copper foil-backed paper or cloth.

Plastic film:

Polythylene film; Polythene; Cryovac; Kordite; Koroseal; Pliofilm; Ceran; Vaposeal; Airwrap; Vinylite; Duraclear; Cellophane; Alathone.

Parafined cardboard drums and boxes
Waxed or parafin paper
Plastic jars and bottles
Glass jars, tubes, jugs and carboys
Tins
Waterproof paper lined bags of cotton or burlap
Rubberized fabrics and papers

Wrapping materials: — non-waterproof

Heavy kraft or jute envelopes:
Special seed envelopes with a double-locking fold.

Cotton sheeting bags

With or without rodent-proofing impregnation.

Canvas or burlap sacks

Labelling

All lots of seed whether small or large should bear a secure label on the innermost envelope, bag, box or other wrapping. On small lots the label may be in the package itself as on a folded seed envelope. On large bags or cans a tag or label should be enclosed with the seed itself as well as an outside label.

The seed consignment form, approved by the Sixth Session of the Conference of FAO to facilitate the exchange of forest seeds and plant material for scientific use, provides space for the names and addresses of the consignee and the sender, the gross weight of the package, the nature of the contents, the common and scientific (Latin) names of the species, and record of disinfection. An identification number referring to other data pertaining to the seed should also be placed on all tags, tickets and labels. Certification tags issued by quarantine inspectors and customs officials will also be affixed to each package.

LATIN - AMERICAN CONFERENCE ON PULP AND PAPER

At the invitation of the Argentine Government a meeting of officials, technicians and industrialists will take place at Buenos Aires in October to discuss pulp and paper development in Latin America. The meeting, which is being organized under the joint sponsorship of FAO and the Economic Commission for Latin America, will be in the nature of a round-table discussion and seminar.

It is expected that representatives from all the Latin-American republics will attend, as well as prominent specialists in the pulp and paper field from other parts of the world. Emphasis is to be given to the economic and technical phases of manufacturing pulp and paper from locally available resources and to problems affecting markets. Among the items to be discussed will be:

1. pulp and paper consumption, production and trade in Latin America;
2. economic aspects of pulp and paper manufacture:
   (a) from conifers,
   (b) from tropical and sub-tropical broadleaved woods,
   (c) from bagasse;
3. essential steps in planning new pulp and paper industries;
4. development prospects for pulp and paper industries in selected Latin American countries.

EIGHTH PACIFIC SCIENCE CONGRESS

The Eighth Congress of the Pacific Science Association, which embraces all countries in or bordering the Pacific Ocean in Asia, Oceania and the Americas, was held in the Philippines in November 1953. The Proceedings are obtainable from the Executive Secretary, National Research Council of the Philippines, University of the Philippines, Quezon City.

Among the important recommendations adopted on forestry, one recognized the need for co-ordinated forest products research in the Pacific area. Attention was drawn to the card system developed by the Division of Forest Products, CSIRO, Melbourne, Australia, which with slight modifications is already formulated for Malaya, New Guinea, North Borneo, Australia and the Philippines. It was suggested that other Pacific countries desirous of adopting such a macroscopic card sorting system should use a similar card to contain information exchangeable within the Pacific region.

Chairman of the Standing Committee on Forest Resources of the Pacific Area was H.G. Keith, Chief, FAO Forestry Mission, Philippines. Members were drawn from Australia, Canada, Hawaii, Honduras, New Zealand, Nicaragua, North Borneo, Peru, the Philippines and the United States.

The Pacific Science Council decided to hold the Ninth Congress at Bangkok in January 1958.

Fundamentals of Logging Steep Slopes

by A. Koroleff

Director, Woodlands Research Division, Pulp and Paper Research Institute of Canada, Montreal

Since the war, through the work of FAO and undertakings such as the Point Four Program (United States), the Colombo Plan (Commonwealth) and others, organized endeavors to develop or improve logging operations by the introduction of better methods and equipment have been greatly intensified in many underdeveloped countries. In some already industrialized countries a similar trend is evident in the widespread demand for more efficient logging methods. Rising labor costs are emphasizing the importance of logging mechanization.

However, there seems to be a lack of clearcut data — in print at least — on the principles that should guide organized improvement of logging, and particularly the choice and transplantation from one country to another of certain locally well-proved logging practices. Although certain logging methods are, even intrinsically, more efficient than others, what is sound under one set of conditions may be quite impractical elsewhere. Those who determine which logging methods can be profitably transplanted from one country to another are dealing not merely with the techniques and economics of forest harvesting but are exerting a much deeper and more lasting influence.

A sound logging practice should meet at least the following requirements: it should make efficient use of the most appropriate power source, and it should be consistent with forest management objectives.[1]

Sources of power for logging

The three main sources of power for logging are:

a) human and animal power;
b) machinery (operated on solid or, usually, liquid fuel [2]);
c) the harnessed force of gravity.

In most underdeveloped countries the first source is likely to be cheap on a per hour basis, but the cost per unit of wood produced may be comparatively high, as the efficiency of native logging practices is frequently low, and an adequate labor force may or may not be available in the timber areas to be logged. Obviously, a substantial increase in productivity, without a corresponding rise in labor costs which would largely offset that gain, is desirable. But to achieve this requires careful study, competent leadership, conscientious and patient work toward that objective, and considerable time.

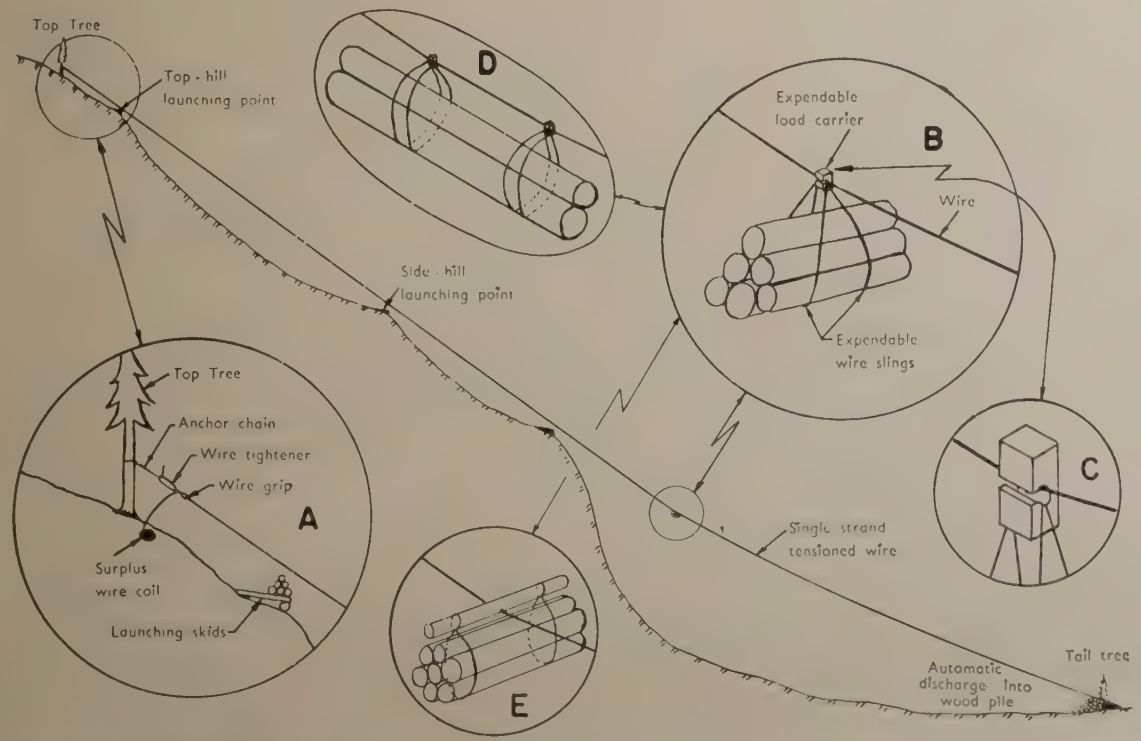
The managements of timber enterprises having ample capital, particularly those possessing this advantage in little-developed countries, tend to act quickly to introduce logging machinery that is efficient, if conditions are suitable. This machinery — principally of American make or type — is always dependent on liquid fuel. Its efficient operation necessitates competent supervision, skilled labor, adequate maintenance provisions and delivery of liquid fuel, often imported, to the machine in the forest. In many cases all this is so well justified that the endeavor is a success, notwithstanding the expense and problems of adjustment. This applies especially to large-scale, concentrated operations in valuable timber. However, frequently the underdeveloped countries simply cannot afford the machinery and the liquid fuel, or the machinery may not fit in with the physical conditions or the overall economy of the country. Even in the United States there is a feeling that some of the present-day logging machinery, which is geared primarily to large-scale, concentrated forest operations, is too costly. There seems to be a need, therefore, to develop equipment and efficient techniques which will meet the requirements and the modest means of small wood producers. It is claimed that decentralized logging often offers considerable advantages in lower overhead, economic stability and perhaps conservation.

The force of gravity is an excellent and freely available power source for logging if it can be suitably harnessed, either on land or water. River driving, frequently a very cheap means of transporting wood over great distances, has in the past played an important part in the economy of many countries, and still does in many places. In a number of underdeveloped timber countries, efficient river driving is yet to be introduced. It must be remembered, however, that the low floatability of some species is unfavorable. The use of logging flumes and gravity chutes, which was never very great, has apparently been declining. Gravity cableways have made as yet only a limited contribution in the field of mountain logging, notwithstanding the variety of types available. They are often lacking in mobility, and are rather costly. Yet, among possible power sources for logging in rough terrain, the force of gravity still remains largely unharnessed.

[1] In a broad sense — including the needs of forest labor management and such important forest influences as soil and water conservation.

[2] In nearly all countries where logging has been partly mechanized, the dependence on liquid fuel appears to be very great, whereas the use of wood as fuel for logging machinery is limited and continues to decline. Only in the U.S.S.R. has the reverse trend been noted in recent years. The policy there is to operate logging machinery chiefly by electricity produced from unmerchantable wood, including slash, via producer gas or, less frequently, steam.

FIGURE 1. — WIRE SKIDDING SET-UP FOR THE TRANSPORT OF WOOD



Wire skidding is operated by gravity over a suspended single-strand steel wire from the top and slope of a steep mountain.

A - *Upper terminal and uppermost wood launching point*

B *Descending load of bolts*

C *Small, slotted hardwood block, serving as expendable load carrier*

D *Descending load of logs (same load carriers as in B and C; sling wire loops bent double)*

E – *Load of bolts, uppermost of which serves as carrier; (this bolt has a narrow, ½ – 1 in. (1.3 – 2.5 cm.) deep, saw or axe-made notch for riding upon the suspended wire).*

How efficiency may be increased

Improvement in the efficiency of logging methods may come about as a result of:

1. better planning and supervision, time and motion studies, labor training and other means of eliminating waste of effort, improved tools, etc. — without any fundamental change in method;
2. adoption and judicious adaptation of the more efficient techniques and equipment developed elsewhere;
3. systematic research leading to the development of new methods entirely suitable to local conditions and complying with the requirements of sound logging practice.

This last approach seems to be the one least used. Unless a logging technique is, so to speak, made to order, it is not likely to meet all the essential requirements. On the other hand, the development of technique on a soundly pre-selected, specified basis is usually far from easy. However, it should be undertaken in an effort to find a substitute for primitive logging practices which are fundamentally unsound.

Practically all over the world the conventional way to bring wood down steep, rough slopes is essentially unsound from the point of view of power source, efficiency and conservation requirements. The prevalent practice is for a teamster and a draft animal to struggle up, then down, the hill for each load, with much zigzagging. Where the ground is too steep or too rough for the animal, the customary procedure is either to move the wood manually with the aid of gravity, however strenuous the effort, or to abandon it as inaccessible.[3]

The logical solution of this problem is to arrange one-way transport by gravity, with the wood moving down, clear of the ground, over a suspended wire or wire cable. To warrant wide use, such a system should be cheap, simple, efficient and highly mobile. Over a long period of time and in many different places, attempts have been made to move wood or other materials from steep slopes, or from the ground above them, by gravity over a suspended cable. This principle is employed in some commercial cableways and is used by some farmers in mountainous countries, such as Norway and Switzerland, for transporting their produce into deep valleys. But loggers have as yet profited very little from such cableways, because most of the existing arrangements lack both flexibility and mobility.

The principle of wire skidding

Wire skidding is the term introduced in eastern Canada by the writer several years ago when work was started to develop a technique for transporting pulpwood down steep slopes over a suspended wire. Periodic experimenting and design was carried out by the Pulp and Paper Research Institute of Canada in co-operation with several paper companies, and the Institute's wire skidding method is now being adapted to several commercial operations.[4]

As shown in the illustration, a wire is suspended between a tree or a stump on the mountain and another at the bottom. This single-strand, steel wire, only slightly thicker than a match, is quite inexpensive but very strong.[5] The overall grade between the terminals [6] can be from approximately 25 to 60 percent; and the wire span may be up to at least 1,500 feet (460 m.). Surprising as it may seem, this thin wire can carry loads of one-quarter or even one-third of a ton — that is, up to about 15 cubic feet ($\frac{1}{2}$ m³) of pulpwood — at a speed of 50 miles (80 km.) per hour. For still greater loads, thicker and correspondingly stronger wire should be used. A load is suspended from the wire by a small, slotted hardwood block, about 1 $\frac{1}{2}$ × × 2 × 3 or 4 inches (3.8 × 5 × 7.6 or 10 cm.), and by slings of thin wire, 0.07 – 0.1 inches (0.18 – 0.25 cm.). Being very cheap, the load carriers and wire slings are expendable.[7]

So far, this method has been used chiefly with four-foot (1.2 m.) pulpwood bolts, the individual bolts being up to 30 inches (76 cm.), but mostly under 10 inches (25 cm.) in diameter. When bolts are small, a load consists of several: when large, it may consist of only one or two bolts. However, a limited experience with 8 foot (2.4 m.) bolts and with 12 foot (3.7 m.) logs, up to 15 inches (38 cm.) in diameter, suggests that these can be wire skidded at least as efficiently as short bolts.

Two men, working fairly steadily but not strenuously with wood brought close to the launching point, can usually send down the wire about 1,000 cubic feet (28 m³). of wood per 8 hour day. This output rate allows for the initial installation of the wire and the moving and re-rigging of it at a new location from time to time. A two-man crew can usually rig the wire across a span of a quarter of a mile (0.4 km.) in less than half a day. It makes little difference in operating the wire whether the span is short or long. Once launched, the load travels automatically. To launch the load, either the wire is raised slightly at the back until it takes off, or the load is lowered off the supporting skids. A semi-automatic launching which takes advantage of the load's own weight is also possible. On reaching the lower terminal — usually within 30 seconds — the wood is discharged automatically by the force of its impact with the tail tree; yet breakage has been negligible, in the Institute's experience. If the wood is to be landed into a stream rather than at a roadside, this is easily accomplished by means of a load interceptor. This device may be simply an old tyre hung over the wire above the water and guyed to a tree.

The greatest part of the work consists of making up and launching the loads: gravity does all the rest.

[3] The use of chutes, gravity inclines and cableways is rare, because they require comparatively large concentrations of wood to justify the considerable investment involved.

[4] A full description of the method is given in the bulletin *Wire Skidding – Wood Transportation by Gravity over a Suspended Wire*, by A. Koroleff and R. D. Collier, Pulp and Paper Research Institute of Canada, Montreal, 1954.

[5] Gauge 8 (0.16 in. or 0.4 cm.) wire, priced at about 1 or 1 $\frac{1}{2}$ cents a foot (3 or 5 cents per m.) has a breaking strength of well over two tons. Its weight per 1,000 ft. is only 68 lb. (10 kg. per 100 m.).

[6] Declination of a straight line between them.

[7] When used only once, the load attachments cost about U.S. $0.50 per 100 cubic feet (2 $\frac{3}{4}$ m³) of wood transported.

Medium-sized loads of pulpwood (several bolts, totalling as much as 6-7 cubic feet, or approximately $^1/_5$ m³) can usually be made and launched by two men at a rate of one or two per minute. When the wood is small, wire skidding may even be operated by a single worker.

In addition to the main wire and the expendable load attachments, the equipment consists of a hand-operated wire tightener and a grip which serves to attach the wire to the tightener, permitting any extra length of wire to be left coiled. For a quarter-mile span, the whole set costs $100–$150. The wire is quite durable except when it is kinked through carelessness.[8]

The ground profile under the wire matters only insofar as the overall grade of the suspended wire and the assurance of a sufficient ground clearance for wood loads are concerned. Since the wood travels over the wire entirely through the air, often higher than the tree tops, it is immaterial how rough and steep the slope is; it may even be a precipice. However, the wood launching points, whether near the mountain top or on the slope, should be chosen so that the ground drops steeply immediately below them.

While as yet only single-span wire skidding has been developed by the Institute and the co-operating companies to the stage of commercial practicability, some preliminary work has also been conducted on a multiple-span, continuous-wire system, with intermediate supports which permit changes in both the gradient and direction of the wire and also allow extension of the range.[9] Study of this technique is to be continued.

Although wire skidding is a new technique, it works effectively and may be considered as a highly mobile, simple and economical means of transporting wood down steep, rough slopes. There can hardly be any question about the suitability of the principal power source in wire skidding and about the compatibility of this technique with conservation needs. While common practice in the logging of steep slopes tends to clash with the fundamental principles of sound logging — efficient use of appropriate power, and consistency with forest management objectives — wire skidding conforms with these principles.

[8] Not only is single-strand wire much cheaper than a wire cable of the same breaking strength, but for wire skidding it is decidedly preferable to a cable in several other respects.

[9] Tandem use of several independent wire spans may be practical in some cases; but it requires rehandling of the wood at the junctions.

The next issue of *Unasylva* will be devoted to the:

FOURTH WORLD FORESTRY CONGRESS

Dehra Dun, India

11-22 December 1954

Commodity Report

Sawn Softwood, 1952 and 1953

The years 1950 to 1952 witnessed considerable fluctuations in the demand for sawn softwood, affecting the levels of output and trade[1]. The year 1953 saw stability restored to the market in almost every part of the world. At times in the preceding years, disparate trends were manifest in the markets in different regions, buoyancy in Europe contrasting with a distinct easing in North America, and vice versa; in 1953, the markets in all regions showed a favorable development.

Industrial activity, which had begun to pick up at the end of 1952, continued at a high level throughout 1953 in most parts of the world. In the main consuming countries, demand for sawn softwood reached a high level and this, along with some stock replacement buying, led to a larger turnover in the sawn softwood trade. Prices, after the fluctuations of 1950-2, remained remarkably stable during the year, reflecting and confirming the new confidence in the market, and facilitating a return to normal activity in the trade at all levels.

While both exports and imports rose substantially from the low levels of 1952, the improvement was restricted to intra-regional trade; the volume of inter-regional trade declined, particularly that between Europe and other regions. Thus, while the total volume of world trade in sawn softwood rose 10 percent above the 1952 level, the volume of trade between regions fell by 20 percent. The 1951 boom had led to considerably increased buying from Europe and North America by such countries as Australia, the Union of South Africa and various Latin American countries; in many cases, purchases rose faster than did effective domestic demand. Because of the time lag between contracting and delivery, much of this trade moved in the year 1952. In 1952, the upwards trend of prices was checked and then reversed. Thus many of the importing countries outside Europe and North America found themselves faced with high stocks of expensive imported sawnwood at a time consumer resistance to high prices was increasing. This naturally led to a marked falling-off of imports in 1953.

Though this normal market reaction was primarily responsible for the decline in inter-continental trade which occurred in 1953, mention should also be made of two longer-term factors, whose importance is likely to increase: firstly, the efforts which are being made to increase domestic output of sawn softwood in these regions, thus reducing dependence on imports from Europe and North America; and secondly, the continuing tendency to replace sawn softwood by hardwood.

World output of sawn softwood in 1953 is estimated at 45.6 million standards, against 44.4 millions in 1952. Most of the recorded increase took place in North America, where output rose from 19.1 to 19.6 million standards. No figures of the volume of output in the Soviet Union in 1953 have been published but, according to the five-year plan for 1951-55, the volume of sawnwood output should increase by 50 percent. The output of sawnwood in the Soviet Union has been officially given as 49.5 million cubic meters in 1950. Of this some 2.5 million cubic meters may be estimated as being hardwood, the remaining 47 million cubic meters, or roughly 10 million standards, being softwood. On the basis of the planned targets, it must be assumed that the output of sawn softwood in 1953 exceeded 12.5 million standards, as against some 12 million in 1952. Output in the rest of the world, approximately 13.4 million standards in 1952, is estimated to have risen to 13.5 million standards in 1953 (Table 1).

TABLE 1. – PRODUCTION OF SAWN SOFTWOOD
(including box boards)

	1950	1951	1952	1953
	1,000 standards			
North America	*18 906*	*18 338*	*19 077*	*19 585*
United States	15 470	14 681	15 234	15 600
Canada	3 436	3 657	3 843	3 985
Europe	*9 480*	*9 400*	*8 520*	*8 650*
Austria	697	694	629	684
Belgium	50	51	51	60
Denmark	62	60	80	62
Finland	875	1 055	750	870
France	655	792	556	556
Germany:				
Western	1 709	1 598	1 380	1 275
Eastern	(670)	(660)	(650)	(650)
Greece	20	15	17	15*
Ireland	3	3	2	2
Italy	222	217	242	230*
Luxembourg	3	8	3	6
Netherlands	28	28	14	14*
Norway	358	310	400	375
Sweden	1 140	1 300	1 195	1 250*
Switzerland	181	173	197	188
Turkey	43	24	25	25
United Kingdom	73	65	56	54
Yugoslavia	503	363	345	360
U.S.S.R.	*(10 000)*	*(11 000)*	*(12 000)*	*(12 500)*
South America	*600*	*850*	*850*	*850**
Africa	*190*	*200*	*200*	*210**
Asia	*2 460*	*2 550*	*3 320*	*3 300**
Oceania	*470*	*450*	*470*	*460**
TOTAL	*42 106*	*42 788*	*44 437*	*45 555*

* Unofficial figures.

[1] See *Unasylva*, Vol. VII, No. 3. These reports are published on the sole responsibility of the FAO Staff.

TABLE 2. – TRADE
(in thousands of standards)

Region	1951	1952	1953
EXPORTS			
North America	*2 217*	*2 002*	*1 985*
Canada	1 799	1 726	1 745
United States	418	276	(240)
Europe	*2 762*	*2 145*	*2 622*
Austria	516	522	594
Finland	838	592	675
France	185	71	97
Sweden	908	696	956
Yugoslavia	139	104	145
Eastern Europe [1] [2]	61	94	119
U.S.S.R.[2]	*136*	*129*	*(224)*
Latin America	*320*	*220*	*(300)*
Brazil	233	136	(200)
Africa	*5*	*2*	*(5)*
Asia	*100*	*25*	*(20)*
Japan	93	19	(10)
Pacific Area	*10*	*9*	*(10)*
New Zealand	11	7	(10)
WORLD TOTAL	*5 550*	*4 532*	*5 166*
IMPORTS			
North America	*1 184*	*1 200*	*1 010*
United States	1 145	1 153	1 270
Europe	*2 046*	*2 394*	*3 180*
Belgium	1 640	981	1 447
Denmark	172	396	386
Germany, Western	198	236	319
Italy	378	274	332
Netherlands	163	124	146
United Kingdom	118	106	104
U.S.S.R.[3]	*62*	*123*	*71*
Latin America	*320*	*310*	*(300)*
Africa	*350*	*250*	*(280)*
Egypt	132	60	(60)
French North Africa	66	83	(85)
Union of South Africa	122	81	(100)
Asia	*140*	*120*	*(130)*
Israel	47	30	(20)
Japan	29	5	(20)
Turkey	11	36	(67)
Pacific Area	*210*	*140*	*(125)*
Australia	202	126	(100)
WORLD TOTAL	5 212	4 537	5 396

[1] Bulgaria, Czechoslovakia, Eastern Germany, Hungary, Poland and Romania.
[2] Importers' figures. Exports to countries of western Europe.
[3] Exporters' figures. Imports from countries of western Europe.

World trade in sawn softwood, as shown in Table 2, rose from 1952 to 1953 by about 16 percent. The biggest increase was recorded in Europe, where imports rose from 2,394 to 3,180 thousand standards, or by 33 percent.

NORTH AMERICA

The United States gross national product reached a new high level in 1953; in real terms it rose 4 percent over the 1952 level. Industrial output for the year was up by 8 percent. Construction activity set a record in both dollar and volume terms. The United States demand for housing has been one of the major expansionist factors in the North American sawnwood market since the war. For the fourth year in succession, new housing (non-farm) starts exceeded a million. Moreover, the trend to larger and better-quality housing continued, as evidenced by the greater increase in one-family house unit cost than in the construction cost index. A further shift away from urban building brought a rise in public non-residential expenditure (highways, sewers, etc.). In both the public and private sector the rise in non-residential construction was more marked than that in housing, a specially sharp increase being recorded in commercial construction, which had been limited in the two preceding years by restrictions on the use of scarce materials and credit regulations. On the other hand, industrial construction declined during the year as defense expansion programs reached completion.

These developments contributed to the strong demand for sawnwood which prevailed through most of 1953. After August, however, industrial production began to decline, and by the end of the year had fallen 7 percent below its previous peak. Housing activity, at its peak in the first quarter, fell off in succeeding quarters to pick up to around the year's average in October-December. On the sawn softwood market, demand declined in the closing months of the year: the volume of new orders dwindled, orders unfilled at the end of the year were considerably lower than a year earlier, while stocks at mills were substantially higher in most cases (Table 3).

The index of lumber prices, which had moved up from 120 in January to 121 ½ in April, eased very gradually down to 116½ in December.

At the end of the year the outlook was one of cautious optimism. Constructional activity was being fairly well maintained; and, though in the non-durable consumption goods industries as a whole sales were well down and inventories up as compared with a year earlier, in the lumber products industries sales remained steady in the last four months of the year at around the end 1952 level while inventories, though about 13 percent higher than a year earlier, were showing no tendency to rise steeply.

EUROPE

The European sawn softwood market emerged from a sustained period of stagnation towards the end of 1952 when British importers started making large-scale purchases for delivery in 1953. Other importing countries joined the British, and business was brisk, with

TABLE 3. – NEW AND UNFILLED ORDERS, AND STOCKS, AT UNITED STATES SAWMILLS
(in million board feet)

	1952				1953			
	I	II	III	IV	I	II	III	IV
New orders during the quarter								
Douglas fir	2 503	2 408	2 678	2 491	2 743	2 693	2 283	2 377
Southern pine	2 160	2 245	2 291	2 078	2 202	2 251	2 080	1 814
Western pine	1 540	1 897	2 195	1 943	1 727	2 017	2 056	1 760
Orders unfilled at end of quarter								
Douglas fir	961	828	812	820	925	838	746	750
Southern pine	318	334	372	295	356	344	269	202
Western pine	465	548	675	628	643	679	342	342
Stocks at mills at end of quarter								
Douglas fir	993	923	902	1 043	1 021	1 002	1 006	987
Southern pine	1 610	1 618	1 552	1 562	1 655	1 743	1 766	1 976
Western pine	1 585	1 680	1 864	1 767	1 664	1 557	1 781	1 874

prices rising, until the turn of the year, when the market remained very steady, with business being transacted at an even pace and an absence of serious price fluctuations. Market stability, so much longed-for on all sides after the feverish fluctuations of 1950-2, seemed to have been attained. A resumption of the rise in industrial production and a high level of constructional activity stimulated demand and the steady market encouraged buyers to replenish their stocks. In the closing months of the year the lifting of controls on consumption in the United Kingdom brought a new flurry of buying, with some price rises, but by the year's end the market was again calm, with most purchases by the main importing countries in Western Europe being made at slightly falling prices, especially for inferior qualities.

The course of some of the main factors influencing sawnwood demand in Western Europe in 1952 and 1953 is set out in Table 4.

The recovery in industrial production was general; the number of dwellings under construction rose to post-war record heights in France, Western Germany and the United Kingdom; the volume of exports was well maintained, at a level considerably higher than that of mid-1952. All these developments helped to expand sawnwood requirements.

TABLE 4. – WESTERN EUROPE 1952-53: SOME ECONOMIC INDICATIONS

	1952				1953			
	I	II	III	IV	I	II	III	IV
Industrial Production (1950 = 100)								
	111	110	103	116	113	116	110	124
United Kingdom	106	102	91	105	107	108	100	113
France	117	114	101	113	111	113	95	113
Germany, Western	121	125	126	141	129	137	138	152
Italy	113	116	112	122	119	124	125	138
Dwellings under construction (in thousands)								
United Kingdom	231.7	251.7	276.1	280.3	294.1	314.2	322.1	309.4
France	233.8	248.0	260.3	274.3	284.1	303.6	330.7	...
Western Germany [1]	101.0	130.1	137.0	127.3	92.2	155.2	166.7	155.8
Volume of Exports (1950 = 100)								
	113	105	102	117	110	116	117	...
United Kingdom	106	93	86	95	94	96	97	106
France	107	104	94	112	107	114	96	124
Germany, Western	144	148	155	171	151	174	180	217
Italy	112	104	99	109	104	112	122	132

[1] Dwellings authorized

But though activity in the main wood-consuming industries in 1953 was a good deal higher than in the previous year, the available evidence suggests that sawn softwood consumption did not rise correspondingly. The dearth of data concerning consumer's stocks makes it difficult to draw any convincing conclusions regarding final consumption, but there is reason to believe that the fall in international prices has not succeeded in checking the trend towards substitution. One reason is that domestic resale prices have been slow to follow the trend in the international market. It will be remembered that growing consumer-resistance to ever-increasing prices led to the break in the autumn of 1951. Thereafter import prices fell precipitately. Prices to consumers fell later and less. Nevertheless, much of the stock disposed of by importers and merchants in 1952 was resold at prices well below its earlier (1951) cost. When buying was resumed towards the end of 1952, import prices turned upwards again, and domestic prices followed within a couple of months. Thus at the beginning of 1953, though activity in the wood-using industries was picking up, and import prices were still below their 1951 peak-level, prices to the consumer were not very different from those which, 15 to 18 months earlier, had come up against strong consumer-resistance.

Price is the major issue confronting the European sawn softwood market today. When prices soar, consumers turn away from wood; when prices fall, they do not automatically turn back. In each price cycle, wood loses ground. To recapture lost markets, and conquer new ones, European suppliers and importers need to convince wood users that their prices are not only reasonable, but have every prospect of remaining steady for some time ahead. On the latter point, the course of the market in 1953 offered more encouragement than any previous post-war year, in spite of the upturn that attended the lifting of consumption controls in the United Kingdom towards the end of the year. On the question of a reasonable level of prices, views naturally differ. Many in the importing countries hold strongly that the present level is still too high to give back to wood its former competitive power; in the exporting countries the feeling is that the possibilities of reducing costs are limited. Clearly all links in the producer-to-user chain have a common interest in technical progress that will lead to lower production costs and improved distribution.

Though conditions in 1953 were favorable, production of sawn softwood in Europe (excluding the U.S.S.R.) did not rise by more than some 130,000 standards, or from 8,520,000 standards in 1952 to about 8,650,000 in 1953. The main exporting countries, Austria, Finland and Sweden, together increased their output of sawn softwood by some 300,000 standards, while the main importing countries as a whole failed to maintain their level of output.

Competition between sawmills for available log supplies, and in some cases competition from the pulp mills, led, however, to a rise in the prices of sawlogs, especially in central Europe. This development caused concern to producers since it limited their possibilities of effecting any downward adjustment of sawnwood prices at a time when price questions were coming more and more to the fore.

In spite of only a minor rise in output, European trade in sawn softwood was 20 to 25 percent higher than in the preceding year, and there were one or two significant shifts in the trade pattern. East-west exchanges continued to grow; imports into western Europe from the U.S.S.R. and other eastern European countries rose by 116 thousand standards to 339 thousand standards, while western exports to east Europe declined by 50 thousand standards to 81 thousand. Present indications are that the volume of east-west trade in sawn softwood will continue to increase, with the Soviet Union steadily resuming her pre-war role as one of Western Europe's most important suppliers.

European exports to countries in North Africa and the Middle East rose slightly, but overseas exports to Australia, South Africa and Latin America suffered heavily from United States and Canadian competition and declined sharply from their 1952 level.

In the course of the year there was a net shift in stocks from the exporting countries to the importing countries. At the end of the year stocks in the main exporting countries were unusually low, while those in some of the importing countries, and notably in the United Kingdom, had risen substantially over the end-1952 level [2].

East-west trade

Trade in sawn softwood between eastern and western European countries continued to develop in 1953. Exports from eastern to western Europe increased from 223,000 standards in 1952 to about 340,000 in 1953. Shipments from the U.S.S.R. increased from 129,000 to 222,000 standards, and those from Poland and Czechoslovakia by about 25,000 standards. Most of the increased shipments went to the United Kingdom, but both Belgium and the Netherlands also increased their imports from these sources. Trade in the other direction fell from 131,000 to 81,000 standards as a result of a fall in Soviet imports from Finland to 71,000 standards as against 123,000 in 1952.

Recent discussions on the further development of east-west trade have emphasised the possibility of expanding shipments of sawn softwood from eastern Europe, and estimates formulated at the autumn 1953 session of the Timber Committee of ECE indicated a prospective further rise in 1954, especially from the Soviet Union.

Latin America

Though sawn softwood production in 1952 was maintained at the 1951 level, the volume of trade, both within the region and with other regions, declined sharply; the most striking fall was in Brazilian exports to Argentina, from 230,000 to 132,000 standards. In 1953, however, both extra-regional and intra-regional trade effected a marked recovery: Brazilian paraná pine strengthened its position on the European market and exports rose by 50 percent over the 1952 level. Prospects for 1954 are even more favorable, since by the

[2] For a detailed analysis of the European situation reference is invited to the quarterly bulletin *Timber Statistics for Europe* published jointly by the Economic Commission for Europe and FAO and obtainable from sales agents for United Nations publications.

end of 1953 sales to Europe for 1954 delivery had already come close to the total volume of that trade in 1953. One factor is the steady progress being made in methods of sorting and classifying sawn softwood, thus increasing its acceptability on export markets. At the same time, it must be recognized that consumption levels in Latin America are very low and are bound to rise in the coming years. Considerable efforts will be required if output is to be raised to the point where both rising domestic demand can be satisfied and overseas markets maintained or expanded.

Africa

Domestic production of sawn softwood in the African continent is relatively small and largely limited to the Union of South Africa. The continent depends mainly on imports, and these have fluctuated considerably in recent years in accordance with the vicissitudes of the world market. The continent's main consumers are Egypt, French North Africa and the Union. The first two look primarily to Europe for their supplies, while South Africa in addition draws on North American supplies from time to time. In 1953, for example, South African imports from Europe dropped sharply, while those from North America increased. Great efforts are being made in the Union to diminish the present degree of dependence on imports and, if current plans are realised, domestic production of sawlogs, today about 30 million cubic feet, should double by 1963.

Total imports into the continent, which fell from 340,000 standards in 1951 to 250,000 in 1952, are believed to have risen to about 270,000 standards in 1953.

Asia

Developed coniferous resources in Asia are few and far between, and Japan is the only large-scale producer and consumer of sawn softwood. With demand for all categories of industrial wood rising rapidly, the pressure on Japan's wood resources grows year by year. Tremendous efforts are being made to make the best use of forest resources and satisfy rising demand; for some years the proportion of the total cut turned to industrial use has been steadily rising. Japan's output of sawn softwood rose from 1,994,000 standards in 1951 to 2,810,000 in 1952. Housing needs account for the major part of sawnwood consumption, and it is estimated that the average 2-3 room Japanese house requires about 3 standards. The current rate of building (270,000 dwelling units a year) is below replacement needs alone, reckoned at 300,000 units a year; on top of this there is still a massive backlog. Thus for many years ahead housing requirements will impose a considerable strain on the country's sawn softwood supplies. The decline in sawn softwood exports may therefore be expected to continue: Japan's net exports fell from 63,000 standards in 1951 to 12,000 in 1952, in spite of the considerable rise in domestic production noted above. The indications are that Japan will henceforward become a net importer of this commodity.

Elsewhere in Asia there is no important production of sawn softwood, and only a few countries import significant amounts. Israel and Turkey have between them imported 50,000 — 60,000 standards annually in the past. During the last three years imports into the former country have steadily fallen, amounting to 47,000, 30,000 and 20,000 standards in 1951, 1952 and 1953 respectively; Turkish imports, on the other hand, have grown from 11,000 standards in 1951 to 36,100 and 67,200 standards in 1952 and 1953.

Pacific Area

Australia, with scanty indigenous coniferous resources, depends heavily on imported supplies. New Zealand is more fortunately endowed, and in recent years has been approximately self-sufficient. Production in these two countries, which rose from 292,000 standards in 1951 to 308,000 in 1952, is believed to have fallen slightly in 1953.

The most striking change in the trade pattern in this region is the increasing reliance placed on North American supplies by Australia. Australian imports from Europe, which had amounted to 87,000 standards in 1951, fell to 32,000 in 1952; this sharp fall continued in 1953, reports from the main European exporting countries indicating an aggregate export to Australia in 1953 of only 8,000 standards. North American shipments have suffered much less; from 89,000 standards in 1951 they fell to 75,000 in 1952, and are estimated to have reached 60,000 standards in 1953.

The reduction of imports into the area, alongside a fairly stable domestic production of sawn softwood, reflects partly a switch from softwood to hardwood and partly lower consumption in some of the main wood-using industries. The number of houses completed in Australia fell in 1953, while in New Zealand the number of building permits issued fell below the 1952 figure, itself a reduction from the 1951 level.

Prices

In the world's two main softwood consumption centers, Europe and North America, prices followed a different course during the years 1952 and 1953. Whereas in Europe sawn softwood prices in 1952 fell precipitately until the late summer, recovering some of the lost ground in the last quarter of the year, the general trend in North America was very slightly upwards, end-year prices representing advances of 5 percent or less over the corresponding figures at the beginning of the year. During 1953, when European export prices remained very steady, registering fractional increases in the course of the year, North American prices gradually fell, by amounts varying between 5 and 15 percent over the whole year.

In North America, the main trade flow, Canada to the United States, is small in relation to total consumption, and it is natural that price fluctuations should be less marked and that price trends should conform to the evolution of domestic supply and demand for sawnwood. In Europe, however, some of the main consumers depend almost completely on imported supplies, while production in several countries is almost entirely oriented towards the export market. International trade in sawnwood is thus far from being marginal, and prices are very sensitive to changes in buying policy.

TABLE 5. – QUARTERLY DEVELOPMENT OF EUROPEAN AND UNITED STATES SAWN SOFTWOOD PRICES

	1950	1951				1952				1953				1954
	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I
Sweden, 2 ½" × 7" u/s redwood battens, f.o.b., Kr. per std.	972 100	1 122 116	1 228 126	1 257 130	1 285 133	1 310 135	1 075 111	955 99	1 063 110	1 091 113	1 098 113	1 097 113	1 115 115	[1] 1 145 118
Germany, Western edged spruce-fir boards, 3-4 m. long, 8-18 cm. thick, 21-34 cm. wide, III quality, DM per cu.m. at sawmill, Bavaria, unloaded.	89.0 100	112.6 127	118.1 133	123.6 139	163.6 184	171.7 193	170.4 192	163.2 184	158.3 178	151.5 170	145.3 164	135.1 152	131.0 152	[2] 129.3 146
Netherlands, weighted quarterly averages of c.i.f. prices of imported sawn softwood 6 ½"-7" wide, guilders per std.	742.7 100	894.1 120	953.2 128	993.4 134	1 030.1 139	1 032.5 139	861.3 116	767.9 103	826.8 111	854.1 115	862.8 116	844.5 114	859.9 116	
United Kingdom, price index of imported sawn softwood delivered to consumers (30 June 1949=100)	95.1	110.7	152.2	155.5	155.5	168.2	161.0	151.4	151.5	151.4	146.8	139.7	138.5	[1] 140.5
Belgium, wholesale price for 2 ½" × 7" u/s battens, B.fr. per m.	29.0 100	32.5 112	34.0 117	34.5 119	37.7 129	37.5 128	33.0 114	28.5 95	32.5 112	33.5 115	33.0 114	33.5 115	34.0 117	
United States of America Douglas Fir, Dimension No. 1 common 2" × 4", RL, U.S. $ per M.bd.ft.	78.09 [3] 100	83.90 107	82.37 105	82.21 105	81.37 104	82.79 106	84.84 109	86.58 111	84.95 109	83.40 107	78.06 100	75.19 96	73.41 94	
Southern Pine, Boards No. 2 and better, 1" × 6" RL, U.S. $ per M.bd.ft.	79.54 [3] 100	80.71 102	78.81 99	78.91 99	80.80 102	79.77 100	78.82 99	81.48 102	82.11 103	80.68 102	78.75 99	77.70 98	75.67 95	

[1] Jan. 1954; [2] Jan.–Feb. 1954; [3] December 1950 = 100.

An examination of the evolution of prices at different levels of the trade in Europe serves to give point to some of the anxieties held in certain trade circles, in spite of the relative stability of 1953, concerning the future course of wood consumption.

As Table 5 shows, Swedish export prices, which reached their peak early in 1952, fell to their lowest level in the third quarter: the sharp improvement noted in the last quarter was continued, at a slower pace, throughout 1953. By the turn of the year, prices were roughly back to the level of the first quarter of 1951. Netherlands c.i.f. prices followed a very similar course. In the United Kingdom, the prices of imported sawn softwood delivered to consumers rose in step with export prices until early 1952; when northern export prices slumped, however, these reductions could not be immediately passed on to the consumers. Much of the timber in stock and yet to arrive had been purchased at peak prices and prices at the retail stage fell only gradually and slowly. At the beginning of 1954, retail prices were still over 25 percent higher than the early 1951 level.

Apart from this disparity between the course of prices on the international market, the events in the latter had their effect on the movement of prices of domestic production. In the boom conditions of 1951, the prices of West German production, for example, soared even more rapidly than did northern export prices: they did not start to fall until the second quarter of 1952, but the fall continued steadily throughout 1953, so that first quarter 1954 prices were roughly 15 percent higher than those of the first quarter of 1951.

In general, therefore, while export prices have returned to the early 1951 level, retail prices for imported sawnwood and prices for domestic production in the importing countries have not. Export prices hardened in the last quarter of 1952, and there is a possibility that consumer-resistance will again be encountered when this increase is eventually transmitted at the retail level. At all levels of the trade there is a growing awareness of the need for a more exact understanding of reactions to current and expected prices down at the consumer level. It is here that the fate of wood consumption in the longer term will be finally decided.

The Work of FAO

Technical Meeting on Forest Grazing

A Technical Meeting on Forest Grazing, the first of its kind to be organized, was held at FAO Headquarters in Rome from 29 March to 3 April 1954. A total of 41 representatives of 24 governments,[1] official observers from the Foreign Operations Administration (U.S.A.) and IUFRO, and several unofficial observers participated.

The Meeting was opened with a welcoming address by the Director-General of FAO, following which the Director of the Forestry Division outlined the considerations which had led to the organization of the meeting.

Officers were then elected with J.F. Pechanec (U.S.A.) as Chairman, and R. Koblet (Switzerland) and A. Latessa (Italy) first and second Vice-chairman respectively. J.P. Challot (Morocco) was appointed as rapporteur.

Policy

In the report of the Meeting, available on request, delegates recognized that, in addition to land regarded by all as forest land, there are extensive surfaces that are of considerable concern to the forester even if trees are sparse or altogether absent, or if the stands are of relatively poor quality or even scarce or irregular; in using the terms forest range and forest grazing, reference to such lands is intended.

In certain countries of the humid-temperate zones where ecological conditions are particularly favorable and a high degree of technical development has been reached, such land surfaces are being utilized intensively, sometimes with a complete separation of lands for grazing and of lands to be used for timber. Elsewhere, these surfaces are generally utilized for extensive, and frequently indiscriminate and unregulated, grazing by cattle or wild animals. They should all be the object of a rational policy for conservation and utilization within the general framework of a national policy aimed at the best balance between crop-lands, forests and grazing lands for the whole of a country.

For any country there are certain basic principles which should govern the formulation and implementation of an adequate forest grazing policy; the Meeting drafted the principles which it considered should be recommended to governments and referred them for consideration to the regional Forestry Commissions of FAO.

Technical aspects

In order to protect and improve the production of timber, forage, soil and water, grazing of forest ranges must be managed on a scientific basis, taking into account the requirements of the forage plants, the trees and the soil.

The Meeting was of the opinion that:

1. the grazing of forest range must be regulated to the extent required by the overall land use plan for the other resources;
2. fire can be a useful but also a dangerous tool in the management of forest grazing areas and must therefore be used with the utmost discrimination;
3. since forest grazing lands often make up a large proportion of important watersheds, the manner in which grazing is managed on watersheds has a definite effect on the quality, quantity and period of release of water that is delivered into the streams;
4. flock migration is often a desirable and necessary form of management in order to utilize the forages in the season in which they are most useful and available, but that some means of administrative control may well be needed to prevent too many herds from moving into limited areas;
5. special measures might be justified to improve forest range lands, such as by reseeding, transplanting of plants or sprigs, applying fertilizers to the range, controlling competing and undesirable range plants, and control of insect and rodent pests;
6. in most regions of the world forest range can furnish only a part of the total yearlong forage requirements of livestock and considerable forage must be produced on other ranges, from improved pastures, and other forage and fodder crops;
7. herbivorous wild animals must be taken into account in range and forest management planning, and must be kept in balance with the forage available through regular harvest of the animals;
8. supplies of fodder from the foliage, flowers and fruit of trees by direct browsing, lopping or other ways is acceptable only if strictly controlled.

Administration

The range resource on government owned or controlled forest lands is a public trust which should be managed and utilized for the benefit of the country as a whole. The question of what lands are to be dedicated to forest range depends essentially on the outcome of government land-use allocation. This should be based upon a sound technical appreciation of the potentialities for grazing, timber, watershed, and other desirable values.

The administration of the forest lands in question should be by scientifically and technically qualified administrators.

The closer integration there is between the use of forest range and the grazing and fodder production of other lands, the greater will be the contribution of both to the welfare of the country. The objective of such integration should be to establish balanced economic livestock-producing units designed to obtain suitable returns from all the land and reasonable financial return to the owner of the livestock.

Co-operation should be maintained at all levels between the administrative organization and the users of the forage range. The collaboration of livestock owners using government forest range should be sought in the development and application of forest policy, rules and regulations and such individuals should be encouraged to recognize their role in the proper use of such lands.

It is important that administration be efficiently decentralized.

Research

Research should be conducted by well-trained scientists and fully coordinated with other forest and agricultural research.

Where it is not possible for individual countries to undertake adequate research to meet their needs, it may

(*Continued on page 84*).

[1] Austria, Burma, Cuba, Denmark, Dominican Republic, Ecuador, Finland, France, Germany, Greece, Iceland, India, Indonesia, Iran, Israel, Italy, Jordan, Pakistan, Philippines, Spain, Switzerland, Turkey, U.K., U.S.A.

Technical Assistance Activities

Over the past two years since the technical assistance program of the United Nations has been in full operation, forestry missions have operated in 35 countries and 97 experts have completed various assignments. Activities at present are on a somewhat reduced scale, due to financial stringency of, it is hoped, a transitory nature, but FAO still has more than 25 forestry specialists working in 15 countries. It is expected that these figures will increase substantially during the latter part of 1954 as the program is allocated more funds. The manner in which the whole program is now financed, on a year-to-year basis, is not a happy arrangement and ways are being sought of permitting the program to operate with more flexibility and continuity.

Burma. *Following the work of the initial mission on the development of new forest industries, an officer has been investigating how best to combine logging by elephants from the felling site with mechanized equipment used for later phases of extraction. An experimental and training logging unit is expected to be in operation this year. Trial operations of a pilot kiln drying and impregnation plant have started. Investigations continue on the behavior and durability under tropical conditions of the sample houses constructed of chipboards made in Germany from Burmese secondary timber species (See "A contribution to Tropical Forest Utilization" by K. A. Miedler,* Unasylva, *Vol. VII, No. 1). Experience with these houses, shown in the photograph, will help determine whether mass production of such boards can be considered economically sound.*

★

Paraguay. An officer continues to act as advisor on general policy and utilization matters. A number of developments are foreshadowed. Paraguay is prepared to take in a number of emigrants from Europe and possibly settlement may be combined with establishing new forest and agricultural industries.

★

Chile. *A team of forestry experts has been making notable progress in Chile since 1951, advising on policy matters, silviculture and management, and utilization. Its members have given instruction at the newly-established forestry faculty of the University of Santiago; one is in charge of the Llancacura logging and sawmilling training center established with equipment provided by FAO. The establishment of the Llancatura center, despite many difficulties, may prove one of more spectacular achievements of the mission. The photograph shows senior students of the School of Forestry, University of Chile, after a day's work in the forest, walking home by a partly constructed road passing through forest land partly cleared by smallholders in Llancacura Reserve, 3 kilometers from the sawmill.*

Libya. A preliminary survey for the purpose of establishing a forest policy was made in 1951. Since 1952 another specialist has been at work on afforestation problems, sand-dune fixation, roadside planting and general encouragement of tree planting. Soil conservation measures, fruit-tree cultivation and management of esparto grass resources form part of the expert's work. He is also giving help in the formulation of forest laws and regulations.

★

Ceylon. *An FAO officer is advising on the use of mechanized equipment for the clearing of land for new plantations and on the layout of tree nurseries. Another specialist has organized a pilot sawmill and wood-working shop for the training of local personnel. Machinery for this plant was provided by FAO, the Ceylon Government and the United Kingdom under the "Colombo Plan". The photograph shows the saw maintenance and repair shop.*

★

Mexico. Following the completion in 1953 of the work of the original broad forestry mission, an expert has been assigned as forestry advisor to the *Nacional Financiera* on the surveying and planned exploitation of forests. This body is concerned with a number of forest industry projects, and first priority is being given to the development of a cellulose factory and integrated forest industries at Michoacan. Another FAO officer has recently completed an assignment on cellulose research.

Iran. *Three specialists have completed their assignments in Iran. An officer is now helping with the final organization of the new forest products laboratory, and acts as general advisor on the wood-using industries, including sawmills, veneer and plywood plants, furniture industry, match factories and paper and paperboard industries. A diagrammatic map showing distribution and types of forest is shown.*

1. *Caspian forests of the northern districts (3.3 million ha.).*
2. *Limestone mountainous forests in the northeastern districts* (Juniperus *forests, 1.3 million ha.*)
3. *Pistacio forests in the eastern, southern and southeastern districts (2.6 million ha.).*
4. *Oak forests in the central and western districts (10 million ha.).*
5. *Shrubs of the Kavir (desert) districts in the central and northeastern part of the country (1 million ha.).*
6. *Sub-tropical forests of the southern coast (500,000 ha.).*

★

Thailand. A specialist in sawmill organization is assisting in preparing plans for a thorough modernization of state-owned sawmills in Bangkok. Time studies are being made aiming at increasing the productivity of existing equipment and personnel; new machinery is being selected and arrangements made for its delivery and installation. The expert is also assisting in the planning of a new large sawmill.

★

Ethiopia. Since 1951, an officer has been acting as general advisor on forestry matters. The nucleus of a Forest Service has been formed, students have been sent to Australia for training, and basic forestry legislation has been enacted. The expert's work has included studies of the climatic conditions with a view to the further introduction of exotic species.

★

Honduras. A news item on p. 93 records the setting up of a Forest Service with an FAO forester and a forester of the United States "Servicio Tecnico Inter-Americano de Cooperación Agricola" (STICA) acting in an advisory capacity, particularly on forest law, timber export control, forest reservation, forest survey, seed collection and resin tapping. The FAO expert has, in addition, participated in a United Nations survey of the development possibilities of the five Central American republics.

★

Indonesia. As a preliminary to a general survey of the possibilities for new forest industries in Sumatra and Borneo to be undertaken during the latter part of 1954, an officer is assisting the Forest Service in establishing logging plans for three selected, typical areas. Recommendations are being made on the most efficient use of the mechanized equipment which is already at hand, and advice will be given on types of material still to be purchased.

★

Brazil. The original FAO mission submitted a comprehensive report to the Government of Brazil in October 1953 on forest development in the Amazon Valley. A new mission has embarked on the work of following up some of the major recommendations. Training centers are being organized, including a demonstration logging center, a sawmilling and saw maintenance and repair school, and a workshop for machinery maintenance. At the same time, an expert is working on interpretation of aerial photographs of selected forest areas for planning purposes.

★

Syria. *A general forestry advisor is maintained in Syria. It is possible that a regional research center and a regional training institute may be established in the country. Syria possesses some fine forest areas. The photograph shows one of the finest, the Latakia forest, which is now being clearly demarcated on the ground.*

(*Continued from page 81*).

be possible for several countries to unite in regional programs. Such regionalization should eliminate duplication and facilitate co-ordination in the development of improved practices.

It should be the policy of all research organizations to publish the results of their research promptly and to foster the interchange of information on programs.

Education and training

In view of the lack of personnel specifically trained in the field of forest range management, this subject is of particular importance.

Forest grazing programs can be efficiently developed only on the basis of fully trained personnel. The upper grades should have had a university or college education furnishing a sound background of understanding of forest range management. If facilities for teaching range management are not available within the country, it will usually be necessary to send promising young men to other countries having such facilities. Additional schools teaching forest range management are urgently needed in many parts of the world. Regional educational centers may prove more economic than to endeavor to develop educational facilities in each country.

For some time personnel necessarily engaged in forest range management and lacking adequate grounding must be trained while on the job and through special short courses.

There is a general need, moreover, for training in extension method.

Technical assistance

Every effort should be made to extend FAO technical assistance in forest range management to all interested countries. It was suggested that:

1. FAO forestry experts sent out under the technical assistance program be directed to give attention to the problems of forest ranges and to help governments set up policies applicable to those lands;
2. FAO forestry experts on range management be encouraged to extend assistance on range lands other than forests in countries where there is no FAO agricultural expert;
3. in the absence of FAO forestry experts on range management, forest services in interested countries be advised to seek close liaison with agricultural technical assistance experts dealing with the general aspects of pasture and allied problems, such as water spreading, and to submit their particular forest range problems to those experts for consideration;
4. forest services be encouraged to send qualified representatives to regional seminars on range and pastures organized by FAO;
5. the subject of forest grazing policy be included in the programs of any forest policy seminars organized by FAO.

Near East Poplar Conference

Some 25 delegates attended a regional poplar conference at Damascus from 5-9 April, representing Cyprus, Egypt, France, Iraq, Italy, Jordan, Lebanon, Netherlands, Spain, Syria, Turkey and the United Kingdom. The League of Arab States and the United Nations Relief and Works Agency also had observers present.

The Conference was opened at the Grand Sérail by the Minister of Agriculture, Mr. Hassan Atrach, in the presence of the Minister of Economics and numerous officials of the Syrian Government. Mr. Atrach was elected Chairman and Messrs. Rachis Habbal (Lebanon) and Yacoub Salti (Jordan) first and second Vice-chairman respectively. Mr. Osman Badran (Egypt) was appointed general rapporteur. Mr. Ph. Guinier, President of the International Poplar Commission, was elected Honorary Chairman of the Conference.

The various delegations reported on the poplar situation in their respective countries, and the meeting was able to note with satisfaction the measures taken by several governments to aid the development of poplar cultivation. There was a continually increasing demand for softwoods for the manufacture of containers, sawn wood, rotary cut veneer and paper pulp. Poplars were also needed for windbreaks in irrigated areas to protect field crops, and to improve natural woodlands growing along watercourses. They provided additional income to farmers and helped relieve the few remaining natural forests from undue pressure by providing a source of wood outside the forest proper.

The Conference recommended that, in land-use planning in each country, land should be set aside to be devoted to poplar growing either as regular plantations, shelterbelts, windbreaks or avenues. Natural poplar stands should be improved by the planting of suitably selected poplar types. Direct or indirect assistance should be provided to poplar growers, and information on the best techniques to be employed both in the nursery and in field planting should be made available to them.

It was agreed that a survey should be made of the various poplar species to be found of cultivated clones (*cultivars*), using an approved identification form. To facilitate identification, 'populeta' should be established in each country and perhaps a central 'populetum' for the whole region.

The present practice of taking cuttings and sets indiscriminately from any tree often leads to excessive pruning. Under no circumstances should more than two-thirds of the total length of the tree be pruned. It was recommended that poplar should only be raised from selected material in specialised nurseries and distributed by duly recognized agencies. Such a varietal control, for whose implementation a regional agreement was thought essential, should also aim at introducing into the countries of the region only poplars of certified origin and well-known properties. This measure was considered to be of the highest importance for the control of pests and diseases.

The question of spacing was carefully studied. For the planting of traditionally cultivated poplar types on irrigated lands and in association with field crops, a *minimum* spacing of 1.50 m. between rows, and of 0.75 m. between trees in the same row, was recommended. Four years after planting every second tree should be thinned and the same operation carried out again after another four years. Should there be a demand for bigger size timber, a wider spacing should be used. Experiments should be continued or started on the optimum spacing, especially for recently introduced *cultivars*.

It was highly desirable to undertake a thorough study of the physical properties of poplars cultivated or growing naturally in each country of the region. Governments were requested to arrange for work of this kind to be started as soon as possible. It was extremely important to improve present cutting techniques, but this could not be brought about suddenly as it would go against long-established traditions and customs. Forestry schools and wood-using industries could contribute much to this end.

The field excursions which were arranged in the week after the Conference included the Wadi Barada, Ghuta and Latakia areas in Syria, Boharré and the Bequaa valley in the Lebanon, and the Troodos and Paphos forests in Cyprus. The excellent preparation of these excursions resulted in a very fruitful exchange of ideas both as regards poplar cultivation in particular and forestry in general.

Equipment News

Interest in the development of forest utilization and woodworking industries is reflected in the continual demand for information on new equipment. FAO's Forestry Division collects such information and passes it to interested Governments. Some of the information collected is published here. FAO accepts no responsibility for the claims put forward by manufacturers.

PLANTING MACHINE FOR SAPLINGS. This machine (system Krause) turns out soil pots from vegetable mould and plants the saplings into the pots in a single operation at a rate of 1,500 an hour. Two persons are needed to work the machine, which is operated by a 1 h.p. electro-motor; one operator puts the saplings singly into the machine, while the other throws in the earth (not too moist) and removes the soil pots from the conveyor belt. All other operations are automatic. The machine shapes the soil into a ball round the freely hanging roots; at the same time condensation in the center, around the roots, can be regulated. The roots are always inserted into the pots in their natural vertical position. By changing the press molds it is possible to obtain soil pots with diameters varying from 40 to 80 mm. The pots can be easily transported to the growing site without damage to the saplings.

Bruno Krause, Manheim-Blumenau, Germany.

PIPE LADDER. — This scaling ladder is made up of 7 links giving a total length of 18.5 m.; it weighs approximately 36 kg.

Holger Rasmussen, Vesterbrogade 136, Köbenhavn V, Denmark.

P.P.K. CULTIVATOR. — This cultivator, fitted with a brush cutter and borer, is mounted on a rigid chassis and has heavy-tread tyres. Depth of the borer, to a maximum of 0.70 m., is regulated by a wheel and locked into a high, off-ground, position. Cultivator operates on the "Flector Pont system". *Specifications:* motor - type K.350, 345 cc. petrol engine, 7 h.p. at 3,000 r.p.m., magneto ignited. Screw-type borer, which rotates up to a maximum of 180 r.p.m., has a 30 cm. diameter.

Etablissements P.P.K., 45-47 Boulevard St. Denis, Courbevoie (Seine), France.

OLIVER LOGGER. — The main characteristics of this logger, which was designed in collaboration with the Forestry Commission, are: free clearance of rear bumper plate allowing maximum load without damage to tyres or frame; load can swing freely over irregular ground; small turning radius; base of bumper plate rounded to give lead to butt ends when loading; hollow pulleys and side guide rollers allowing easy passage of large sling rings or hooks; roller rope guides fitted to head to allow side drag; jib head well overslung for bulky loads; base plate running whole length of frame affords axle protection, and over easy terrain gives good flotation. *Specifications:* overall length, 12 ft. 11 ½ in. (4 m.); overall height, 7 ft. 5 ½ in. (2.3 m.); overall width, 6 ft. 3 in. (1.9 m.); weight, 1.350 lb. (600 kg.); ground clearance of base plate, 14 ¾ in. (38 cm.); capacity, 2 tons.

J. C. Oliver, Ltd., Burton St., St. Pancras, London, W. C. 1., England.

PORTABLE SAW MILL. — This 30 ft. (9 m.) double rack saw bench with run-off and slabbing-side has 15 ft. (4.6 m.) and 8 ft. (2.5 m.) slides, power fed on both sides, and a saw pit capable of taking up to 48 in. (122 cm.) saws. The saw mill is shuttered on both sides and when opened forms a complete cover for the operators. Individual drives to the saw spindles are taken from a ball bearing countershaft mounted across the front of the saw mill and with fixed and loose pulleys to each shaft. It has an 8 × 3 in. (20 × 7.6 cm.) channel steel chassis mounted on solid or pneumatic rubber-tired wheels.

William Reid (Forres) Ltd., Forres, England.

"BESCO" AUTOMATIC SAW SHARPENING AND GULLETING MACHINE. — This machine is suitable for handling saw blades of all sizes from 8 to 40 in. (20 to 100 cm.) in diameter, and up to 1 ½ in. (3.8 cm.) in pitch. An electric motor is built into the machine together with a dust extractor, for the protection of the operator, which is powered by a separate motor. The head carrying the grinding wheel is in heavy ball bearings driven at 1,750 r.p.m. All adjustments are made by four spaced hand wheels which control the pitch, depth of cut, time advance and retard. *Specifications*: 400/440 volt, 3-phase, 50 cycle A.C. motor. Overall dimensions: height, 3 ft. 6 in. (1 m.), width, 2 ft. (0.6 m.), depth, 2 ft. 6 in. (0.8 m.). Net weight, 420 lb. (190 kg.).

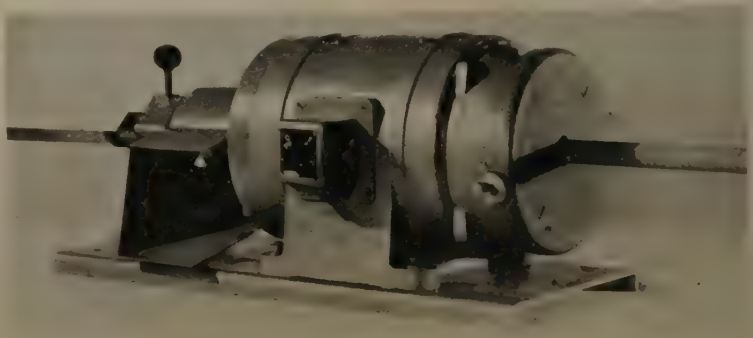
F. J. Edwards Ltd., 359-361 Euston Road, London N.W.1., England.

UNI-POINT RADIAL SAW (Model X36 —¼AF). — It is claimed that this saw always cuts at the same point whether adjusted for a bevel, miter, or compound miter cross-cut angle. *Specifications*: the saw is generally equipped with a 5 h.p. motor and a 16 in. (40 cm.) saw blade with a cutting depth of 5 to 25 in. (13 to 64 cm.) cross-cut capacity, 31 in. (79 cm.) ripping capacity. The table top is of maple, laminated, 2 in. (5 cm.) thick with 2 × 4 in. (5 × 10 cm.) fence — reinforced steel base frame — lever type locking device on raising and lowering mechanism. Net weight 800 lb. (340 kg.). *Motor:* saw generally equipped with either a ventilated motor, 3 h.p. single phase, 3,450 r.p.m., or an enclosed motor, 5 h.p. phase, 3,450 r.p.m.

American Woodworking Machinery Co., 100 Liberty Street, Hackettstown, N.J., U.S.A.

"GNOM" DOWEL MACHINE. — This machine produces 660-1,000 ft. (200-300 m.) of dowels per hour. Dowels have criss-cross intersecting grooves whereby the glue is well distributed both longitudinally and laterally. *Specifications:* base plate 20 × 8 in. (50 × 20 cm.); height, 8 in. (20 cm.); cutterheads for size of dowels, ½ to ¾ in. (1.3 to 1.9 cm.) in diameter.

Hans Heid, Gartenstrasse 120, Basle, Switzerland.



News of the World

The items appearing here are condensed selections of news thought to be of interest to readers of UNASYLVA. They are grouped alphabetically by countries under headings currently used by the Forestry Division for reference purposes. FAO assumes no responsibility for statements in news items accepted in good faith from outside contributors.

General

FRANCE

• The Eighth International Botanical Congress will be held in Paris in the first half of July and will be divided into 27 sections with discussions in the form of symposia under each. The sections of particular interest to foresters are those dealing with phytogeography, morphology and anatomy, general forest botany and wood anatomy, phytopathology and the protection of nature. Before and after the Congress excursions will be organized to typical regions of France and French Overseas Territories.

NEW ZEALAND

• A compact and informative leaflet on forestry in New Zealand consists of chapters from the *New Zealand Official Yearbook*. Information is given on the historical background, statistics and the present status, so that an adequate picture is presented of the current situation and the development that may be expected. Major chapters deal with national forest policy, forest resources, forest authority, forest management, fire protection, soil conservation, public and private forestry, the finance of state activity, forest utilization, overseas trade, research, the principal forest trees, and the strength properties of New Zealand timbers. The national forest survey, begun in 1946, is expected to be completed as to its main objects by 1956 so that New Zealand is well advanced toward the goal of comprehensive and accurate information regarding its resources.

SARAWAK

• The natural resources of Sarawak have been reported on by the Natural Resources Board which consists of the members of all departments concerned with resources. Sarawak, located on the northwest coast of Borneo just north of the Equator, covers about 47,000 square miles (12 million ha.) and had a population of nearly half a million in 1947. A policy of developing the country's resources primarily for the benefit of the people was begun by the first Rajah, Sir James Brooke, over a century ago, and the present Government undertakes to follow the same policy, taking advantage of modern science to speed up development.

Practically the whole natural vegetation is included in the lowland tropical rain forests, with areas of scrub forest subject to shifting cultivation and small areas of moss forest on exposed higher ridges. Forests are primarily of evergreen trees in mixed stands. There are probably more than 2,500 tree species, and over 100 may occur on a single acre (250 per ha.), but no more than 250 species in all are of commercial value at the moment. The tropical rain forest is sub-divided into mangrove swamps, peat-swamp forest, " heath forests ", riparian forests, and several other lesser types. In addition to the principal timber species concerning which considerable information has been obtained, the forests produce a number of other products which add to their value. Accessibility to the forests is still in a far from advanced stage, but the opportunities for expansion of utilization are considerable.

The financial position of the territory is a happy one. There are no income taxes, no public debt, and there is a large treasury reserve. Exports of agricultural, forest and mostly mineral products, have grown steadily and lately very substantially.

UNITED STATES OF AMERICA

• In the state of Oregon, as elsewhere, many surveys of specific natural resources have been carried out and plans for development made. Many of these are generally available but are often more understandable and useful to the specialist than to the interested layman or to general students of the whole field. In many colleges and universities, teaching and research on natural resources is broken down into many departments and schools. Thus there is a widespread need to bring together essential information on each aspect of the whole range of natural resources.

Oregon State College has successfully undertaken such a job in the form of an atlas of Pacific Northwest resources and development. It was able to call on no less than 22 of its own faculty, each representing a department or school and, in addition, received wholehearted help from many agencies and individuals. The subjects covered include landforms, climate types, water resources, soil resources, land capability classification; forest resources; range lands; croplands; types of farming; fishery resources; mineral resources; electric power facilities, transportation; manufacturing development; forest utilization; recreation resources; and population.

Each subject is given a brief general text and appropriate maps, diagrams and tabular material: the maps being of a uniform pattern make comparison simple. The atlas is thus a comprehensive and authoritative summary of the many resources already used or available which make this region so rich, and should be of great value in gaining intelligent understanding from citizens and legislators alike.

• Addressing the Fourth American Forestry Congress, held at Washington in October 1953, President Eisenhower said that it was the purpose of his Administration to create a balanced but advancing economy and prosperity in the country.

" For any group of people who are engaged in the conservation of our resources — in the production of a product which may range anywhere from 15 to 80 or 90 years — you are concerned directly and by reason of your profession with a steady rather than an intermittent and historical-like action in the advancing forces, the advancing tradition, of our economy. You deal more directly than most, I think, in futures — not merely a future of the day after tomorrow or who are we going to have in such an office, or what kind of activity will be going on in that place. You deal in decades, decades in the growth of your product, of the forests and the trees, and in the conservation of all those elements of our continent that make that possible...

When I first led an invading force onto another continent during the war, we went into northern Africa. It was difficult to believe that that area had once been the granary of the ancient world, that it provided the timber and almost all of the agricultural resources that were used in Italy and Greece and Sicily.

Today, in such vast areas, there is just a stretch of sand and desert. The civilization that supported the cities that flourished is gone.

That is the kind of thing that must never happen here. It is through the wisdom, the efforts, the dedication, and the devotion of such people as yourselves, that it will not happen. Too many of us are blind, or indifferent, or just completely ignorant of the facts that make that work so important ".

URUGUAY

• At Punta Ballena, Maldonado Department, among shifting sand dunes that the winds have swept over field and homestead, among

hills, sierras and peaks stripped bare by centuries of intense erosion, and against the background of the wast Rio de la Plata, there is a forgotten Botanical Garden, called the Lussich Forest, which ought to be extremely valuable for scientific studies and also as a seed source.

Punta Ballena, 120 meters high, projects like a spur some hundreds of meters into the Rio de la Plata where it is under the constant lashing of the waves. Opposite is the island of Gorriti that has now been forested by the Forest Service of the Department of Agriculture.

The chief of the Uruguayan Forest Service reports how in 1896 Don Antonio Lussich acquired the land and gradually planted it abundantly with selected species. Apart from the arboretum, over 800 hectares are under pine and eucalyptus.

Species from a great variety of latitudes now grow there; plants from hot countries associating with plants from cold countries, and between these extremes many temperate species. The flora of all continents is worthily represented and the plants manage to live together under purely natural laws.

But now the Lussich forest is neglected real estate, waiting for development.

Fundamental Science

New Zealand

• In genetics research steady progress has been made towards the testing of progeny of the phenotypically elite trees of *Pinus radiata* that have been provisionally selected for the formation of seed orchards. In addition, clonal material has been established for the future study of the effect of different sites on trees possessing the same genotype.

Procurement of seed for comprehensive provenance trials of eight of the major exotic species proceeds steadily where it has not been delayed by deficient seed years; ready cooperation has been received from many countries in Europe and America.

The forest geneticist has served as the research institute representative on the seed committee set up by the Forest Service to locate and inspect stands of exotic conifers of high quality that can be used as standard sources of seed for routine establishment.

United States of America

• Over 180,000 pine seedlings have been planted throughout the South in a series of tests designed to investigate the existence and distribution of geographic races of the four major southern pines. Three hundred cooperators from private, state, and federal forestry agencies are participating. The purpose of the tests is to determine whether genetic differences exist between southern pines of the same species grown under different climatic conditions or on lands of different geological origin.

The four pine species under investigation are loblolly, slash, shortleaf and longleaf. Previous investigations strongly indicate that such geographic races do exist for loblolly pine and that the various races differ tremendously in rate of growth, resistance to disease, and ability to withstand low temperatures. Planting trees of a given race outside the region to which they are adapted may mean heavy financial loss in growth or, sometimes, complete failure. It is hoped that the present study will enable foresters to define racial ranges for the major southern pines.

• The *Department of Agriculture Yearbook* for 1955 will have water as its central theme. Technical committees from the various bureaus concerned are being appointed, and the preliminary work on organization and assignments is under way. The book will have two major purposes:

1. to create a greater awareness on the part of the people of the significance of water resources for their well-being and the possibilities for improving the use, conservation, and management of this resource;
2. to accomplish this goal by means of an objective presentation of the best available scientific knowledge of water as a natural resource, with particular emphasis upon its characteristics and interrelations with land and people.

Silviculture

Canada

• Seven principal tasks in the field of silviculture research have been defined after discussion with members of the timber industry and the provincial services as those on which to concentrate most effort for the years to come. These are:

1. site classification, including the whole field of forest description;
2. silvics and ecology, study of species and their behavior in association with each other;
3. applied silviculture — learning about the way different species of forest trees respond to treatment;
4. growth and yield;
5. reforestation and tree-breeding. The tree-breeding program is being directed towards getting a better strain of spruce for planting stock;
6. methods of organization of forest management and regulation;
7. study of research technical methods.

Government organizations can carry out much work on all these lines except one on which heavy reliance must be placed upon industry — namely, for applied experiments in silviculture or experimental cuttings.

New Zealand

• New Zealand must give reconsideration to the development of its own supplies of hardwoods. One possibility is the development and use of the native species of *Nothofagus* because of their wide distribution and their ready response to silvicultural treatment. The information available on silver beech (*N. menziesii*) has already been brought up-to-date and a similar summarization for red beech (*N. fusca*) shows that it, too, has a potentially important role to play, particularly in the most productive forests in the northwestern part of South Island.

Pure sizeable red beech stands are rare and most of the area of managed beech will have to be developed through conversion of the natural beech-podocarp forest to even-aged beech. The basic method for accomplishing this is the uniform system imposed because of the impossibility of obtaining rapid, large-scale regeneration of the podocarps. The regeneration technique consists essentially in the preparation of the forest floor, timed in relation to the infrequent seed crops and retention of adequate seed bearers, since rapid regeneration requires bare mineral soil, and mere opening of the canopy and treatment of a forest floor, if improperly timed, do not guarantee regeneration.

Another way to improve the hardwood supplies is through intelligent expansion of the area of eucalypts which at present cover only 20,000 acres (8,000 ha.). Past plantings of eucalypts have often been ill-considered in fitting species to sites through ignorance of the climatic requirements of the various useful species.

Forest Injuries and Protection

United States of America

• Aircraft reseeding of several areas burned over in 1953 in southern California national forests was already under way before the fire season had ended. On some areas the helicopter was being used with suitable adaptations for such work and, on other areas, fixed wing craft were employed. Advance field examination, including soil studies, determine both the areas to be seeded and the species to be used. Both grass seed of various species and mustard seed were used, depending on the findings of the field examination. Previous experience indicated that a heavy stand of such temporary and short-lived plants, the seed of which germinate promptly, accomplishes a great deal in holding soil in place during the critical period before resprouting of the native

brush species recaptures a measure of soil control. On all burns, the slopes are from steep to very steep and, since high intensity rains are to be expected, prompt work is required to reduce soil movement.

• In a recent issue of *Fire Control Notes* a valuable point was made by a national forest fire control staff officer in the Pacific Northwest who emphasized that, despite the value of big machinery in controlling fires, the invariable use of such equipment — and waiting for it to arrive at fires — is neither necessary nor good, and in fact has disadvantages. It has long been suspected that foresters dealing with fires have too widely accepted the viewpoint of loggers that fires cannot be controlled without big machinery although, in fact, in the "horse and buggy" days tens of thousands of fires were controlled by hand work.

General dependence on big machinery for suppressing fires leads to:

(*a*) slower arrival at the fire by machinery as compared with crews of men equipped with hand tools;

(*b*) smashing out of wider lines often not needed to control fires, even slowly spreading slash fires;

(*c*) piling up great masses of mixed earth and fuel which may smoulder for long periods and require abnormally heavy expenditure for mop-up and patrol compared with cleaner fuel masses resulting from hand work which burn out more rapidly.

On many fires, use of big machinery is desirable and advantageous but not on all, and the job of the fire manager is to recognize specific situations in which hand work is adequate and economical. Not many years ago, woods crews were the cream of those available for fire suppression, but the modern lumberjack, being wholly a user of power machinery, is no longer skilled in hand work. Thus to an increasing extent, fire control agencies must depend on their own trained and seasoned fire suppresion crews to do hand work on fires.

Mensuration and Surveying

Ceylon

• The place of aerial photography as an aid in planning improved land use and flood control is described by R. Maclagan Gorrie in an article in the United Kingdom periodical *World Crops* for October 1953. Dr. Gorrie, who has worked for many years on the problem of soil conservation in India, Pakistan and Ceylon, takes his examples from his aerial survey work in the Kotmale River headwaters area in Ceylon.

Any comprehensive and constructive approach to the control of floods and the better utilization of available rain run-off must depend upon an analysis of the soil erosion problem, because the amount of usable water is inevitably much smaller than the total run-off from floods. To plan works to conserve moisture and control erosion in detail normally requires intensive study of the ground conditions to analyse the efficiency, or otherwise, of the various types of forest, systems of grazing, crop rotations, methods of field cultivation, intensity of population settlement, road systems, and in fact all the factors which are now grouped under the general heading, land use.

The use of aerial photographs and related air survey methods will, however, go a long way towards reducing the time spent on field work. Air survey was of particular value in such features as the following: appraisal of the effectiveness of forest cover or lack of it in controlling erosion and especially the delimitation of areas requiring afforestation and better control of grass fires; analysis of bare and eroding cultivated areas both in large estates and in small holdings; fixing of maximum permissible slope for cultivation, and generalized planning of terraces and other erosion control works on such lands; study of stream beds to provide torrent correction, especially the positioning of small water-holding dams, boulder check dams, stream clearance and other stream channel and flood prevention works, as well as location and proposals for correcting landslides and soil creep.

United Kingdom

• In 1950-51, after completion of the main census of woodlands in Great Britain, the Forestry Commission undertook a supplementary census covering:

(*a*) hedgerow and park trees;

(*b*) small patches and groups of trees less than one acre (0.4 ha.) in extent, as well as strips and belts less than one chain (20 m.) wide which had been excluded from the main census;

(*c*) small woods of one to five acres (0.4 to 2 ha.) in extent;

(*d*) the woods, and stands or portions of woods, classified as simple coppice or as unproductive in the main census of 1947-49.

This census has now been reported upon in detail. Special sampling methods were used and, to test the accurancy of the procedure, three independent sets of samples were taken. Essentially, the method depended on the use of the accurate Ordnance Survey 10 miles to one inch (6 km. to 1 cm.) map of Great Britain on which grids were laid out which were then examined in the field. The actual standard error due to sampling was 8.5 percent. A detailed description of methods used is given in the Commission's report.

Of the grand total of 3,773 mil cu. ft. (107 million m³) of t 2,744 million cu ft. (78 million or 73 percent, was contained large woods of 5 acres (2 ha.) and over; 222 million cu. ft. (6.3 million m³) or 6 percent, in small woods of 1 to 5 acres (0.4 to 2 ha.); 807 million cu. ft. (22.8 million m³), or 21 percent, in hedgerow and park trees; thus 27 percent of the country's timber reserves are in woods omitted from the main census.

Forest Management

United Kingdom

• The first official survey of private forestry costs in England and Wales covering the year 1951-52, together with supplementary information for the years from 1946-47, has recently been reported. Various difficulties were encountered, including that of gaining the co-operation of owners, the completeness and comparability of their financial records, and that of obtaining good geographical and size-class distribution of the estates sampled.

Information on overhead costs was found generally inadequate, and the survey finally covered the main elements of plantation establishment and initial care including preparation of ground, fencing, planting, beating up, and first-year weeding. Within each of these primary items there was extreme variation in highest and lowest costs. Neither weighted nor unweighted averages were considered to give the best general picture of what might be expected, and the most useful summarization was found to be the cost-size group containing most costs. This showed total cost per acre to range from £ 47 — £ 62 ($326 —$430 per ha.) with, for example, ground preparation ranging from £ 11 — £ 17 ($77 — $119 per ha.) fencing from £ 18 — £ 21 ($124 — $146 per ha.), and planting from £ 15 — £ 18 ($104 — $124 per ha.). Size of plantation, of course, is reflected particularly in cost per acre of fencing which tends to be greater for smaller plantations. It has not yet been possible to obtain costs of thinning and extraction to roadside, although future surveys with the expected improved cost-keeping by owners should make such information available, as well as a finding on overhead costs.

During the years from 1946-47 to date, the trend has been for establishment costs to increase with rising labor costs, although not all the major elements show a comparable trend.

• The Forestry Commission, after consultation with the United Kingdom Forestry Committee, has announced changes in the grants paid to private woodland owners.

The planting grant to owners of "dedicated woodlands", and small woodlands not suitable for dedication is raised from £ 14 to £ 15 an

acre ($96 — $104 per ha.), and the maintenance grant for dedicated wood lands from 4s. 6d. to 5s. an acre ($1.50 — $1.70 per ha.) per annum.

A new grant at the rate of half the "dedication" grant, i.e. £ 7.10.0 per acre ($52 per ha.) is paid for planting after 1 October 1953 to owners who manage their woodlands according to a plan approved by the Forestry Commissioners (i. e. "approved woodlands").

A new grant is to be paid for the next five years for the clearance of unproductive scrub (to be defined in regulations to be issued later), the clearing of which is estimated to cost more than £ 15 net per acre ($104 per ha.), from land which the owner undertakes to restock with trees.

United States of America

• As the Forest Survey in the U.S.A. has continued, it has, by logical development, extended into various fields collateral to the initial purpose of obtaining inventories. One of these areas is the distribution of forest land ownership and the relationship of type, kind and size of ownership to the intent and characteristics of management.

A recent study of this sort dealing with the coast range pine region of California shows the enormous complexity of the private ownership problem which has grown up through the application of the original public land laws, subsequent sale, resale and inheritance. Forest land constitutes 92 percent, or 5.8 million acres (2.3 million ha.), of the total land, and commercial forest land totals 3.2 million acres (1.3 million ha.). Private ownership holds about 1.2 million acres (486,000 ha.) of the commercial forest land. Nearly 2,600 owners had a share of the commercial land, and nearly 5,700 held forest land.

Ownership types include timber holding companies and individuals; range livestock farming companies; other farmers; recreational property owners; and a large number of other classified types. Timber holding companies have 34 percent of the commercial forest land, range livestock farming individuals 18 percent, and timber operating companies 15 percent, the other classes each accounting for less than 10 percent of the total. On all forest land, farming and ranching were the major uses on 2,629 holdings, there was no use on 1,278, there was recreational use on 673, residence on 578, a combination of uses on 427, and timber operations covered 85 holdings. As regards all forest land, two-thirds of the owners lived in the county concerned, nearly one-third outside the county but within the state, and 3 percent lived outside the state. For commercial forest land, in contrast, one-third lived in the county, 60 percent outside the county but within the state, and 7 percent lived outside the state. The analysis of the occupation of commercial owners showed that the operators of other business owned 45 percent, 22 percent were timber operators, 18 percent were range livestock farmers, and other farmers, professional people, office employees, skilled and unskilled wage earners, housewives and retired people each had a lower percentage holding.

Thus the spread of ownership in various categories of people, intent of management, and size of holdings altogether makes an extremely complex picture in this sub-region which may not be typical of broadly similar areas, but at least is typical in showing the large number of diverse kinds of owners who must be reached if even minimum forestry practices are to be employed, and raises the realistic question whether all land classified as commercial forest is ever likely to be managed and used for the primary value as set by nature.

Even though the individual holdings of many of the people primarily interested in forest land for its recreational values, as a place of residence or as a speculative future source of profit are not large, in the aggregate the total is considerable, and such studies as this serve to emphasize the great problem of getting the commercial forest land actually used and managed for production.

Industry and Trade

Canada

• Speaking at Toronto last December, the Chief of the Forest Products Laboratories of Canada said:

"Water transportation, though not as rapid as road and rail transit, has the economic advantage of low cost. It has rendered very valuable service in the expansion of our timber trade. However, not all markets can be reached by water and rail, and road transport will continue to be essential for a considerable volume of our lumber production.

By way of comparison, it is interesting to note that rail transportation costs from British Columbia to Ontario are some three times greater than ocean rates from Vancouver to London.

In recent months there has been considerable discussion of the St. Lawrence Seaway, and indications are that there will be an early start in the construction of this inland water route. This land-bound seaway could have an economic impact of major importance on our lumber trade. Not only could timber from Newfoundland and the Maritime provinces be water-borne to central Canada, but this waterway would permit an all-water route from the Pacific Coast, through the Panama Canal, over the Atlantic to the Gulf of St. Lawrence, and thence inland as far as the head of the Great Lakes. Perhaps indeed the completion of the St. Lawrence Seaway will provide an entirely new look to Canada's timber trade".

East Africa

• A report states that a recent meeting of the East Africa Timber Advisory Board suggested the formation of an East African Timber Trade Federation. The Advisory Board, composed of government officials, businessmen and forestry experts from Tanganyika, Kenya, and Uganda, felt that such a Federation would be of considerable value to the trade of all three territories, especially in regard to the development of export markets.

Germany

• The *Holzwirtschaftliches Jahrbuch* for 1953 contains 31 papers by 27 authors well-known in German circles concerned with wood utilization and research, and gives an excellent picture of the present high status of these professions in Germany. The latest developments in machinery, testing, standardization and the different branches of wood utilization — especially in the field of construction and packaging — are briefly described. The practical usefulness of this yearbook has steadily improved over the three years in which it has been published by the biggest commercial periodical concerned with Germany's wood utilization.

New Zealand

• While New Zealand Forest Products Ltd. has been completing its pulp and paper mills, an even larger project has been evolved to utilize the 250,000 acres (100,000 ha.) of State-owned plantations on the adjoining Kaingaroa plains. This project is to be carried out by the Tasman Paper and Pulp Company, in which private and Government capital will jointly participate. Under an agreement between the New Zealand Government and the company, it will establish a large newsprint mill and integrated sawmill plant drawing for its timber supplies on about 200,000 acres (80,000 ha.) of what is known as the Murupara working circle on the Kaingaroa plains. This extensive scheme, with ancillary services, will cost about £ 28 million ($78.4 million) - about £ 15 million ($42 million) for plant and accommodation and the remainder for roads, the extension of a railway, and the building of a harbor at Mount Maunganui, near Tauranga. In addition to supplying the New Zealand market, both this company and New Zealand Forest Products will export overseas, chiefly to Australia.

Although the Tasman company has still to erect its plants, it has already completed most of the preliminary work connected with its financing and organization and the Government, for its part, has pushed on with extension of road and rail communications to open up the plantations and provide rail and sea access. About 42 miles (68 km.) of new permanent way will have to be built to link the forests with the present Bay of Plenty railway and the new port to be built at

Mount Maunganui. This port will be conveniently placed for Australian trade and will be well equipped with modern loading installations.

The establishment of the Tasman company is an interesting example of co-operation between a Government and private enterprise. The New Zealand Government will not only sell the company its timber supplies, but it will invest about £ 1 million ($2.8 million) of share capital, back the company's preliminary financial arrangements, and establish its essential road and rail communications. Private enterprise will find the remainder of the capital, build and operate the mills and market their products.

The plant for the Tasman company's mills, designed by a Canadian firm, will when completed produce annually 75,000 tons of newsprint, 36,000 tons of kraft pulp and 72 thousand super feet (about 36,000 standards) of sawn timber. The plant is to be erected by New Zealand's largest construction group and two American firms.

Tanganyika

● The mountain grasslands in the southern highlands of Tanganyika cover an area of approximately 300,000 acres (120,000 ha.). Much of this was once covered with forest but, in the course of time, trees and bush have been cut down to provide fresh land on which to grow crops. As the land became impoverished, the countryside became grass-covered and is now, as it stands, of no economic value.

Fierce fires cover vast areas during the dry season, exposing the soil to drying winds and heavy storms which normally introduce the rainy season.

Under conditions such as these, afforestation in some form or other is the only economical means of rehabilitating the countryside. As a step in this direction, the wattle estates of the British Colonial Development Corporation were begun in late 1949; the aim was to establish 30,000 acres (12,000 ha.) of black wattle, *Acacia mollissima* during the next six years. To produce 30,000 acres (12,000 ha.) under wattle, a total area of 44,000 acres (17,800 ha.) was surveyed and subsequently leased from the Government. At present, 17,000 acres (6,900 ha.) have been planted.

The establishment of wattle plantations to produce the maximum yield of bark with good tannin content in the shortest possible time combines both agricultural and silvicultural operations.

Rates of growth vary considerably according to the situation. On the plateaus it is possible to produce trees up to about 20 feet (6 m.) in height at the age of two years while on the poorer spurs rate of growth may be six to eight feet (1.8-2.4 m.) less at the same age.

In the second rainy season a deep furrow is plowed between the rows of trees growing on the slopes to catch all the rain possible and prevent erosion. For this reason it is essential that all the original seeding is carried out along the contours.

Felling of trees and stripping of bark is expected to begin when the first plantation is seven years old, although the ultimate rotation will probably be ten years, when, in the better areas, the trees will have reached a height of 55 to 60 feet (17-18 m.).

The bark will be processed in an extract factory to be situated centrally on the estates: plans for this are now being prepared. The factory will probably have a capacity considerably exceeding the total production of the estates, and efforts are, therefore, being made to encourage wattle-growing by private interests, both European and African, to augment the production of bark. There are vast areas of grasslands available within an economic haulage distance of the factory site.

United States of America

● The story of the Gaylord Container Corporation illustrates phases of the development of commercial forestry in the United States. It goes back to the year 1905 which saw the staking out of the original location for the Great Southern Lumber Company. After an investment of around $15 million in forests, railroads, houses, sawmill and logging equipment, operation of the sawmill started in 1908.

Any enterprise as large as this was soon sawing logs at a fantastic rate and in a very short time extensive cut-over areas accumulated. Consistent with the outlook of the times, attempts were made to determine what phases of agriculture crops, cotton, livestock and poultry might be adaptable to the land. But cut-over land developed at too fast a rate to be absorbed by the agricultural programs of that day.

In 1916, Louisiana Fiber Products built one of the first southern pulp and paper mills primarily to utilize some part of the waste forest material which previously had been burned or left to rot; this mill was not successful but a second, the Bogalusa Paper Company began operations in January 1918. Soon, however, redwood was being brought from the west coast in an effort to keep the sawmill operating at capacity, and two expeditions were sent to Central America — Nicaragua and British Honduras — to locate timber to be brought to Bogalusa for processing. These efforts did not help the paper mill, however, and it became apparent that a continuing local source of raw material must be made available if it were to survive the sawmill. Considering the capital investment involved, changing from one location to another was not only uneconomical but impossible.

After visiting the forests of Sweden, the owners became most enthusiastic about the possibilities of growing a second crop of pine trees on their denuded, cut-over lands. In the winter of 1920-21 the artificial seeding of 800 acres (325 ha.) marked the beginning of an all-out effort to keep the forest land continually productive. At the same time fire protection was established on 5,000 acres (2,000 ha.) and seed trees were marked on areas as yet uncut. The early program gradually shifted from the sowing of seed to the planting of wild stock and then to the establishment of a forest nursery for the growing of satisfactory planting material.

By 1935 it had been finally decided to cut the remaining longleaf pine timber, liquidate the sawmill and transfer all assets to the paper mill. Then, in 1937, the Bogalusa Paper Company merged with Robert Gaylord Inc. to form the present Gaylord Container Corporation. Using as a guide past experience in bringing cut-over land back into production, the new directors decided on an aggressive forest policy, the tangible results of which are now visible on the 472,000 acres (166,000 ha.) of land controlled by the corporation. Located in three districts, all holdings lie within 100 miles (160 km.) of the mill and include a total of 98,843 acres (40,000 ha.) which have been planted to date. It is anticipated that during the next five years 8,000 to 10,000 acres (3,200-4,000 ha.) will be planted annually.

Forest Products and their Utilization

Canada

● Scientists in eastern Canada are reported to have developed a process by which pulp products can be manufactured out of the sawdust produced by British Columbia sawmills. The process, still in the laboratory stage, dissolves sawdust with chlorine dioxide. The method is relatively simple, eliminating the usual complex and expensive pressure cooking. The only obstacle to development of the idea so far has been the high cost of chlorine dioxide. But the chemical has already dropped in price significantly, and scientists are hopeful it will continue to drop as new applications are found for its use. Federal officials say more than two million tons of sawdust are produced in British Columbia every year, and if salvaged would make 560,000 tons of pulp worth about $56 million, or hardboard worth nearly $100 million.

Chile

● A member of the FAO Forestry Mission reports as follows:

"1. Better grading, both on paper and in practice, is essential to better exports of Chilean woods and a better internal demand for these woods.

2. Tepa (*Laurelia serrata*) is so plentiful a tree in Chile and so attractive a wood if free of stain and rot that after 1. above the next most important item is better handling of tepa, by quick extraction, sawing and drying, and by chemical dipping or soaking or pressure treatment.

3. Coigue (*Nothofagus dombeyi*) is so plentiful in Chile and so troublesome to dry and use satisfactorily that means to overcome its slow and uneven drying are the next most important item.

I sent recently an enquiry on the kiln drying of coigue to the Forest Products Laboratories at Madison (U. S. A.), Melbourne (Australia), Princes Risborough (U.K.) and Pretoria (South Africa) simultaneously. All replied promptly and helpfully. Melbourne's reply is specially valuable because they have much experience of an Australian *Nothofagus, Nothofagus cunninghamii*, myrtle beech or Tasmanian myrtle, which is closely related and evidently similar to Chilean coigue. Unfortunately, none of the four laboratories hopes much from the steaming of coigue, or any other wood, whilst green, to speed up or ease subsequent drying. Preliminary air drying to some 30 percent moisture content, followed by kilning, is strongly recommended, with special lifting and transfer trucks so that the same pile, first made for air drying, can be moved into the kiln when ready. We shall make this widely known and try to have it put into practice.

4. The overcutting of roble (*Nothofagus obliqua*) is such that it is important to find out more about the natural durability and stability of the two main alternatives to roble, namely ulmo (*Eucryphia*) and tineo (*Weinmannia*). They are often sold in mixture with roble but are believed to be much less durable, naturally, and to be less stable; and they are known to treat with preservatives more easily than roble.

5. We visited the Government Research Station on Vines and Wines at Cauquenes, including their cooperage. They use French oak (imported), rauli and American oaks (imported), and like them roughly in that order. The rauli behaves well but does not give the wine the same bouquet as French oak, and makes the white wine an amber color, instead of the clear color got when oak is used. They have not tried coigue yet. There is a minimum of machinery but excellent traditional handicraft.

For vineyard stakes they use ciprés de las Guaitecas (*Pilgerodendron*), railed north from Puerto Montt, the southernmost point on the main railway system of Chile, some 870 km. from Cauquenes. These last indefinitely. It appears to be only a question of time, however, before either exhaustion of the accessible supplies or increased cost of ciprés stakes will make treated insignis pine stakes an attractive alternative. We are going into the costs and possibilities of this, because there is likely to be a major problem soon in finding markets for the rapidly growing volume of insignis pine ready for first thinning, in the 800 square miles (200,000 ha.) of pine plantations in the Concepción region.

6. There was a Congreso Forestal at Concepción on 20-22 November with emphasis on utilization, especially of insignis pine for paper pulp. FAO took part presenting five short papers, covering soil and water conservation, forest management, milling, drying, grading, preservative treatment and marketing. The meeting was promoted by prominent members of Concepción University and the community specially interested in growing and using pine and other timber".

India

• A new periodical entitled *Composite Wood* is being published by the Research Institute at Dehra Dun. The Board of Management includes the heads of the Indian Forest Service and of the Forest Research Institute, with Dr. Ing. D. Narayanamurti as editor. Serving to promote the study and practice of the science and technology of composite wood (adhesives, plywood, laminated and other improved woods, building board etc.) and allied subjects, the first issue included original papers on investigations carried out at the Dehra Dun Institute and selected abstracts.

United Kingdom

• A comparison between the amount of energy it takes to produce 1 lb. of laminated timber as against 1 lb. of steel is contained in a recent issue of the Timber Development Association's quarterly review.

On the basis of sawing and machining only, the energy required to work the wood in 1 lb. of laminated timber is of the order of 5 British thermal units. In the course of its manufacture a pound of steel is raised to its melting point at least twice, the energy to do this and this alone, taking no account of waste, is 568 B.T.U., and the pound of wood has strength properties which in certain important directions are greater (pound for pound) than the steel.

Compared with steel it is lighter strength for strength, more fire resistant, more readily curved and much more easily formed into tapered members. Compared with reinforced concrete it is 10-15 times stronger along the grain weight for weight, and compared with pre-stressed concrete at least three times stronger weight for weight. There is some evidence that, when made with outer laminates of dense hardwood and inner laminates of lightweight timber, it can have a higher strength to weight ratio than any other material that is used structurally — even high duty alloys used for aeroplanes.

United States of America

• Experiments and research in an attempt to produce a rodent-proof plywood are reported for the construction and rodent-proofing of the enormous facilities necessary for storing surplus grain and farm products. The result was the development of a product known as "Gilwood" by incorporating a 4-mesh, 23 gauge, standard ungalvanized wire mesh between the outer ply and the next inner ply, in the manufacture of standard plywood. This step involved only a few problems in manufacturing technique which were soon solved.

Once the rodent proofing requirements were met, tests were undertaken to determine advantageous or detrimental effects on the plywood. These tests appear to show that incorporating the wire mesh greatly increased the strength of "Gilwood" over standard plywood.

"Gilwood" is claimed to offer the following advantages over standard plywood:

1. It is rodent-proof, which represents untold savings in rodent damage.
2. It is at least double the strength of standard plywood, hence can be used at one-half the thickness required for standard plywood.
3. There is a saving of nearly one-half on freight and shipping costs per thousand square feet.
4. There is uniform distribution of stresses and strains over the entire sheet, and bridging and reinforcing of weak fibers in the wood, due to the wire mesh reinforcing.
5. There is a saving in original mill costs, on a comparable strength basis.
6. There is ease of handling and applying, due to lighter weight of sheets.

• A trade report says that products from what is termed "reconstituted wood" or "castwood" are expected to change manufacturing processes and design in hundreds of conversion industries, and revolutionize thousands of consumer products in many fields. The reconstituted wood can be formed into intricately contoured shapes of extraordinary strength and physical properties.

Castwood is the culmination of 15 years' research by the Weyerhaeuser Company; Forestrong Company developed the methods of reconstituting the fiber into industrially usable shapes.

On display for a recent demonstration were products such as television cabinets, tool handles, printing plate blocks, ladies' platform shoe soles, window frames, cabinets, contoured shoe last blocks, croquet balls, bowling pins, mallets, textile picker sticks, and watertight ammunition packaging.

Forest Policy

Colombia

• Chapter XIII (forest education) of Colombia's new forest law promulgated on 1 September 1953 provides evidence of the wider understanding of forest values now apparent in many Latin American countries, at

least in government circles if not among the population as a whole:

Art. 54. A chair of silviculture will be set up at all agricultural colleges and technical schools throughout the country.

Art. 55. Holders of diplomas from government and private agricultural colleges will be required to prove that they have followed a course in forestry.

Art. 56. In order to ensure improved practical training in forestry at the colleges mentioned, these will set aside land for forest research.

Art. 57. School forests will be started, and municipal authorities will be charged with obtaining, for both urban and rural schools, land for the cultivation of fruit trees, ornamental and forest trees.

Art. 58. State and private colleges will be required to include in their curricula instruction in silviculture, tending of trees and the techniques of forming forest plantations.

Czechoslovakia

• A law promulgated in November 1953 set up a central administration for the country's water supplies under the Ministry of Forests and Forest Industries. The functions of the new administration include:

1. control of natural water courses and systems;
2. planning the country's water supplies and distribution to all sectors of the national economy;
3. supervision of development projects involving the utilization of water power, in collaboration with the Ministry of Fuel and Power;
4. supervision and maintenance of hydraulic installations with the exception of hydroelectric stations;
5. responsibility for water supply projects, purification of supplies, regularizing stream flow where forest improvement measures alone have proved inadequate, and for navigability of waterways and construction of canals;
6. technical research on improving hydraulic installations.

French West Africa

• A large-scale forestry and grazing program is outlined in a recent report to FAO.

The aim is to ensure permanent grazing resources by the establishment of grazing reserves, by forbidding the cultivation of food crops (except by tribal herdsmen) within a certain radius of watering points, and by protection measures against brush fires.

The territories principally affected are Senegal and the Cameroons, comprising for the most part savanna and wooded steppe, and having a heavy livestock population. In Senegal it is planned to bore wells along the routes followed by grazing animals in the semi-desert scrubland of the Ferlo region. The success of the project, which aims at stabilizing a population of some 150,000 nomad herdsmen, will also require certain forestry measures; if no control is exercised, land around water points is soon overgrazed, any trees are cut down and the soil rapidly ruined by fire, so that the wells have to be abandoned.

In the Cameroons, the program is designed to change the present practice of uncontrolled cattle breeding to selective production by reducing the area of land grazed at one time, marking out the boundaries of grazing land, controlling fires, and improving the range by the introduction of new forage species. The forest services are responsible for the planting of shelterbelts around pastures as anti-erosion measures, at a cost of 29 million francs ($83,000) for 1,000 kilometers of belts enclosing 135,000 hectares.

As regards timber production proper, the program aims at:

1. supplying local populations with wood for construction and fuel by plantations near urban centers. Felling can begin after 10-15 years (according to the region and the species) and it is estimated that 51,940 hectares will be planted between 1953 and 1957 at a cost of over 1,000 million francs ($2,857,000 million). At the time of writing the report, 6,000 hectares had been planted — mainly in the Ivory Coast.

2. ensuring a sustained yield of timber for export. The present system of "creaming" the most valuable species results in high extraction costs, despoliation of the forest and small chance of regeneration of desirable species. The present long-term program aims at enriching the high forest — allowing 50 years for okoumé and 80 for mahogany — and raising the yield per hectare from its present low level of 10 m^3 to 300 m^3.

Honduras

• A Forest Service came into being on 1 July 1953 under the Dirección General de Bosques, Aguas, Minas y Tierras of the Ministry of Agriculture.

Sub-divisions within the Forest Service have not yet been created because of lack of sufficient trained personnel. However, with the staff available, aided by two forestry advisors representing FAO and the United States' "Servicio Tecnico Inter-Americano de Cooperación Agricola" (STICA), the following work has been started:

1. a general survey of the country to study the forestry problems outlined by previous FAO and other missions;

2. reforestation of national forests on El Picacho and the Sierra de Juana Lainez;

3. establishing of nurseries on El Picacho and Juana Lainez for reforestation purposes, and planting trees in parks, along roads, etc.;

4. demonstrations of a new resin tapping method for pine;

5. regular inspections of saw mills and logging operations;

6. preparing forest reservation projects, as for instance for the pine and broadleaved forest area at Cusuco in the northwestern part of the country in the mountain range Espiritu Santo;

7. a widespread campaign waged for more than two years to fight forest fires during the dry season. The majority of the forest guards will be employed again this year to fight enemy number one of the pine forests of Honduras;

8. a project to control the transport and export of sawn wood in order to put revenue collection on a sound basis;

9. mensuration in some pine forests, in order to get data on the growth of the various pine species;

10. preparation of a new forest law to be submitted to Congress this year.

Hong Kong

• A report on forest policy by the Forestry Officer, introduced by the Director of Agriculture, Fisheries and Forestry, was tabled at a meeting of the Legislative Council last December. Subject to the availability of funds, the Government was prepared to take the steps necessary to give effect to the policy recommended.

The report states that approximately three-quarters of the area of the Hong Kong territory is hill land predominantly grass-covered but with scattered areas of scrub forest. Grass is cut over wide areas by villagers for fuel, and during the dry season grass fires are common, resulting in gradual destruction of the vegetation and leading to erosion, floods, damage to agricultural land and shortage of water. In addition, owing to poor soil conditions, the standard of living of the rural population is low.

The soils of the territory are suitable for forestry and in 10-15 years forests could be established over a considerable proportion of the area.

At present, the Forestry Division is largely employed on protection work preventing illegal cutting of trees and shrubs and checking damage by fire. Several thousand trees have been planted annually, the area of plantations in existance being approximately 3,000 acres (1,200 ha.). Land in catchment areas urgently requiring afforestation is about 5,000 acres (2,000 ha.). The Forestry Division also carries out amenity planting, felling and pruning of roadside trees, the clearing of trees from building sites and many other miscellaneous jobs. There is also a scheme for assistance to woodland owners.

The various land problems of the territory, including problems of water supply, erosion and soil fertility, would

best be solved by a vigorous policy of afforestation and it is strongly recommended that the forest policy of Hong Kong should be, first, to afforest the waste hill lands in order to stabilize the soil, to prevent erosion and protect water supplies and, second, to produce the maximum quantity of fuel and timber, and to encourage private and village forestry.

United States of America

• The International Convention of CIO-CCL[1] Woodworkers held at Vancouver (Canada) in October 1953 reaffirmed the principles of forest policy which have the unanimous support of American woodworkers and forest workers. A resolution to this effect called for direct supervision by federal services of all timber exploitation on federal land carried out by large companies, sawmills, paper mills, mines, railways, etc., and recommended the extension of state and federal-owned forest property, the creation of new national forests — particularly in the redwood forest region — and the afforestation, under the control of the forest service, of river basins which have suffered abusive treatment in the past.

The Convention again declared itself in favor of intensive forest management on a sustained-yield basis, of selective cutting and of the multiple use of forest land, and declared itself against large-scale clearcutting and short rotation periods.

It also requested financial aid for small forest owners and forest farms, mainly in the form of revised taxation systems and extension of credit facilities.

• Foresters will be interested in reviewing the 1953 report of the chief of the Forest Service, which gives special attention to grazing on national forests. Approximately 61 million acres (24.7 million ha.), or 44 percent of the western national forest area, and about ¼ of the 22 million acres (8.9 million ha.) of eastern national forests is grazed by livestock. Most of the range is forested, much of it being commercial timber land. All of it, whether forested or non-forested, has important watershed values. The eastern national forests are grazed by a limited number of cattle, sheep and swine. Over 1.1 million cattle, 3 million sheep and a few goats graze in the western national forests. This represented a total of 7,332,000 animal unit months of use by domestic livestock in 1952. There were also 4,430,000 animal unit months' grazing by big game animals, about double that of 20 years ago.

About 11 percent of the total beef cattle population and 22 percent of the total stock sheep in the western United States graze on national forests for some part of the year. The forage furnished by national forests is about 7 percent of the total feed requirements of livestock in the western United States. The high mountain summer ranges hold a key position in the yearlong operations of most of the 23,500 stockmen who hold permits; they form an essential link with the lower elevation spring, fall and winter ranges and with improved ranch properties, which provide feed for the livestock at other times of the year. The agricultural economy of the western United States, which is based largely on irrigation and livestock production, is also inseparably linked to national forest ranges. This is true not only because of the grazing values of the latter but because they are also primary water-yielding lands. The national forests embrace the head waters which furnish most of the flow of major western rivers and streams used for irrigation, water power and domestic purposes. In the 11 Western States, the national forests yield about 53 percent of the total runoff although they occupy only 21 percent of the area. Grazing use of the national forests is therefore integrated and co-ordinated with the multiple use policy of management which recognizes water and timber production as paramount uses, with equitable consideration for the interest of stockmen, holidaymakers, hunters and fishermen, and the general public.

The Forest Service has traditionally fostered two policies in its administration of the grazing resources of the national forests:

1. proper stocking and improvement of range resources to achieve desirable watershed conditions and sustained high level production of forage;
2. equitable distribution of the grazing privileges to favor medium and small ranchers dependent on national forest range; but with due consideration to the larger operators.

These policies will continue to govern national forest grazing use but more emphasis will be given to expanded co-operation from users in making range improvements, and in fostering even greater stability of livestock operations dependent upon these ranges. Approximately 72 percent of all grazing permits in 1952 had been in the same family for more than 10 years and 40 percent for more than 30 years. Even those in effect for 10 years or less had served the same ranch or permitted livestock for considerably longer. Thus there has been a high degree of stability of national forest grazing permits. The Forest Service has encouraged the formation of local grazing associations and advisory boards through which permittees could express collectively their views and recommendations regarding management policies. More than 800 such boards and associations have been organized.

The total investment of the United States Government in range improvements on national forests is about $3.5 million for reseeding and another $16.9 million for such facilities as fence building, development of watering places and stock driveways. Grazing permittees during the past ten years have spent some $8.8 million for reseeding and other range development, including value of materials and labor for construction and maintenance.

[1] CIO-CCL = Congress of Industrial Organizations - Canadian Congress of Labour.

Selected Reviews

Forstoecologie (Forest Ecology). Franz Hartmann. Illus. Georg Fromme and Company, Vienna. 1953. 168 schillings (paper bound).

This ecological study of forests discusses the reactions of the basic ecological factors, such as, climate, vegetation, and soil. The emphasis is on the influence of these reactions on the soil and how the soil reflects the summation of these reactions in terms of tree growth and vigor. The forest soil profile with its organic surface is a record of the conditions under which it developed, including the influences of present and past management practices. The dynamic nature of soil has been frequently recognized, but the illustrations that Hartmann uses to show the changes that can be produced in a forest soil by management practices make of soil a malleable and sensitive medium for tree growth.

In this study of ecological factors, the author sets out to remove the ambiguity which surrounds terms associated with the condition and type of the organic material found on the forest floor. He describes the various agents and processes through which forest humus types are produced: arthropods, worms, fungi; anaerobic processes, abiological (sphagnum so pure it accumulates unchanged), and moor formation. With these processes accurately differentiated, he describes a definitive system of nomenclature for the humus forms. He develops the clearest picture of soil development the reviewer has read.

The greater part of Hartmann's text builds up the information necessary for recognizing the ecological structure — soil types and factors influencing their development, humus types and facts of their origin, vege-

tation indicators of soil and humus conditions, root systems and their significance — to provide the tools necessary to accomplish the purpose of the book, that is, recognition and mapping of site conditions and site quality for tree growth by simple techniques readily applied in the field.

The last section on fertilizing and correcting poor conditions in forests is included because of the present intense interest in the subject in Europe. Cultivation techniques accompanying reforestation are being studied. It is an illuminating section for those who are not aware of the present day drive in Europe to improve silvicultural techniques.

In spite of its European background, this book, which represents a lifetime of study, has practical application elsewhere in the world where much European soil terminology has been adopted because of the parallelism in soil conditions. It should be profitable to the professional forester throughout the world. The reviewer would appreciate comments as to the desirability of translations.

T. W. Daniel, Professor of Silviculture, Utah State Agriculture College, Logan, Utah, U.S.A.

LES EUCALYPTUS EN AUSTRALIE ET EN TASMANIE (Eucalypts in Australia and Tasmania). H. I. Renier. pp. 125. Direction de l'Agriculture du Ministère des Colonies. Brussels. 1953.

The author participated in the Eucalyptus Study Tour arranged by FAO in Australia in 1952, seeking information on eucalypts for adaptation in the Belgian Congo and Ruanda-Urundi. He devotes several chapters to conditions in Australia: physical geography, geology and soils; climatology; vegetation; silvicultural methods emphasizing natural regeneration, and reforestation; the special characteristics of eucalypts and the wood-using industries based on this genus. The book is well illustrated and contains a useful eight page bibliography.

CHECK LIST OF NATIVE AND NATURALIZED TREES OF THE UNITED STATES (INCLUDING ALASKA). E.L. Little Jr., Agriculture Handbook No. 41. U.S. Forest Service. pp. 472. Washington D. C. 1953. U.S. $2.00.

Prepared under the direction of the U.S. Forest Service Tree and Range Plant Name Committee, this publication is the latest revision of the check list first prepared by G.B. Sudworth in 1898, and revised by him in 1927.

The present revisions are based on the International Code of Botanical Nomenclature which was adopted by the Seventh International Botanical Congress at Stockholm in 1950. The check list includes 77 families, 252 genera, 865 species, 61 varieties and 101 hybrids or a total of 1,027 species, varieties and hybrids.

The simple rules applied in the preparation of this list, if followed by foresters and botanists in all countries, would do much to reduce the confusion which now exists in the naming of trees and commercial timbers.

VEGETATION AND WATERSHED MANAGEMENT. E.A. Colman. pp. 412. Ronald Press Company. New York. 1953. U.S. $7.00.

One of a series of research studies sponsored by the Conservation Foundation of New York City, dealing with complementary aspects of the national water resources, this book brings together and analyzes current knowledge on the relationship of vegetation and its management to flood control, water supply and soil erosion.

Findings under one set of conditions cannot be transferred safely to other conditions, even though broadly similar. Much of the research to date has dealt with extreme conditions such as the steep, brush-covered mountains of southern California, or extreme treatments of vegetation, such as removal of forest, gross and prolonged overgrazing, and the practice of hill agriculture. At the other end of the scale, for example in the case of gently sloping lands, permeable soils and non-harmful uses, again a good deal is known.

It is in between that major gaps of knowledge exist. What, for example, is the degree of grazing that will maintain a percentage of plant cover sufficient to protect water and soil values? Or what systems and intensities of timber harvesting may improve water yield through reducing interception and prolonging snow melt? Or where and how may fire be used to change brush to grass without major damage to water yield and soil?

The present study contains much useful information on these and similar broad problems, the techniques adapted to different purposes and conditions, and the relations between the various sciences involved in this very wide field.

A METHOD OF ESTIMATING TIMBER VOLUMES FROM AERIAL PHOTOGRAPHS. M.J. Ferree. pp. 50. State University of New York, College of Forestry, Syracuse. 1953. U. S. $1.00.

Reviewing briefly the historical background of the technological developments and procedures of photogrammetry, the author emphasizes recently-developed methods whereby timber volume-per-acre classifications can be made from aerial photographs.

The publication has, as its principal objectives:

(1) appreciation of historical development;

(2) comprehension of the role of statistics;

(3) knowledge of application of techniques;

(4) a proper understanding and respect for degrees of accuracy.

Emphasis is placed throughout on the ease of application of the techniques in order to overcome resistance to the use of aerial photography in timber cruising.

The author studied the use of infra-red and panchromatic film on two scales, 1:16,000 and 1:20,000. He points out that more experimental work is required on the type of photographic film and filter combinations, the season of year for taking photographs and photographic scales, and looks forward to such new developments as use of color film, and a wider employment of the helicopter in forest survey.

The booklet is recommended to all foresters concerned with survey and timber estimating, especially in temperate regions. A similar publication for tropical forest conditions is greatly needed.

TIMBER: ITS STRUCTURE AND PROPERTIES (3rd edition). H. E. Desch. pp. 350. Macmillan and Company Ltd., London. 1953. 25s.

The third edition of this well-known handbook, originally published in 1937, is a useful, condensed encyclopaedia of timber technology with the stress mainly on wood anatomy and wood preservation, which are the author's special fields of investigation. The other sections of the book covering the properties and utilization of wood have been brought up-to-date and results of new investigations have been added.

EL SECADO DE MADERAS EN ESTUFA (Kiln Drying of Wood). A. Parra, G. Borgo, F. Valdés. 1953. pp. 119. Asociación Mexicana de Profesionistas Forestales, A.C. Mexico.

Latin-American countries are somewhat lacking in both general and specialized forestry literature, so that anyone interested in the field often must have recourse to foreign works and sources of information, usually in a language other than Spanish. This booklet is published as one step towards remedying the situation.

Mexican forest industries are paying increased attention to the drying of wood in kilns. With the great variety in local climates, ranging from arid desert to humid tropical, kiln drying of timber is of great importance to producing better quality seasoned products for consumer markets. Once the home market has been supplied, kiln drying will also help Mexico to export good-quality dressed lumber and wood products.

AN ATLAS OF END-GRAIN PHOTOMICROGRAPHS FOR THE IDENTIFICATION OF HARDWOODS. Forest Products Research Bulletin No. 26. Department of Scientific and Industrial Research. pp. 87. Her Majesty's Stationery Office London. 1953. 12s.6d.

Consisting of almost 400 photomicrographs showing the structure of timbers, this bulletin is intended for use in conjunction with Bulletin No. 25, *Identification of Hardwoods: A Lens Key*. Readers who are not in a position to verify the identification of timbers from the key by comparing samples with authentic specimens, should find comparison with the photomicrographs in the present publication useful.

The features used for identification in Bulletin No. 25 include the character of the pores, the presence of soft tissue, and growth rings, and the species are grouped accordingly. The appropriate photomicrographs are readily traced through the comprehensive index.

ADHESIVES FOR WOOD. R.A.J. Knight. pp. 242. Tudor Publishing Co., Inc. New York. 1952. U.S. $5.00.

This monograph assembles results of extensive investigations carried out by the Forest Products Research Laboratory, Princes Risborough, by the Research and Development of Materials Branch of the Ministry of Supply, and by the author himself. It describes and classifies the principal adhesives according to their durability, and then proceeds to discuss gluing techniques and methods of testing. With its good selective bibliography this publication is valuable as a work of reference for both the professional man and the student.

WOOD PRESERVATION (second edition). G. M. Hunt and G. A. Garratt. pp. 417. McGraw-Hill Book Co. Inc. New York. 1953. U.S. $7.50.

This second edition, as was the first, is intended to serve both as a text for students in forestry and engineering and as a reference volume for those engaged in the wood preserving industry, for purchasing agents and engineers concerned with the use of wood, and for others interested in the development and promotion of new materials and methods of treatment.

Since the appearance of the first edition in 1938 there have been many developments in practically all aspects of wood preservation, and a large amount of new technical data has been published by the numerous agencies and individuals working in the field. It has been the aim of the authors to incorporate the significant material contained in this mass of new information, at the same time retaining the discussion of fundamental principles and essential facts contained in the earlier volume.

RESEARCH IN THE ECONOMICS OF FORESTRY. William A. Duerr and Henry J. Vaux, editors. pp. 475. Charles Lathrop Pack Forestry Foundation. Washington. 1953. U.S. $6.00.

The main feature of a project financed by the Charles Lathrop Pack Forestry Foundation and sponsored by the Society of American Foresters, this commendable work has a dual object: to define the economics of forestry as a field of organized knowledge and to explore the methods of forest economics as a field of research.

The introduction describes forest economics as a science rapidly developed during the last half-century but still immature. This immaturity has three aspects. First, the content or scope of the field has yet to be clarified; second, its function is as yet imperfectly recognized; and third, its research method remains unsystematized.

The editors claim that forestry has three characteristics which serve to distinguish it in *economic* terms from the great bulk of activities covered by the general term, economics.

First, forests have far longer production periods than are commonly encountered in other lines of economic activity. "Long-run" supply and demand adjustments, which in many agricultural and industrial commodity markets may take place within a period of very few years, in a timber market may require a minimum of several decades before they make themselves felt. Economic imperfections and lags in response may therefore constitute some of the most important and critical problems of forestry.

Second, standing timber plays a role in production economics which is rare among economic goods. Much standing timber is considered alternatively as either capital plant or finished product. This dual economic role can be analyzed only by methods which are not commonly applied elsewhere in economics.

Third, a substantial proportion of the values produced by the forest are not directly measured by existing markets. (It is important to note that this does not necessarily mean that these values are not measurable in monetary terms or their equivalent). This is partly a result of the particular institutional environment within which it has been customary to provide certain forest services, such as recreation, outside the conventional market framework, and partly because certain forest values, such as watershed protection, can be measured only indirectly, through rather complex analysis.

The function of forest economics research, therefore, is to provide owners, administrators, legislators, and the general public with a basis for intelligent decisions on the economic aspects of managing forest lands and utilizing their products and services.

RESOURCES AND THE AMERICAN DREAM (including a Theory of the Limit of Growth). Samuel H. Ordway, Jr. pp. 55. Ronald Press Company. New York. 1953. U.S. $2.00.

The "American dream" as described by the author, who has also written *A Conservation Handbook*, is the idea of a constantly increasing level of living resulting from improved technology applied to abundant raw materials to produce all types of products as required by a growing population. His theory of the limit of growth is, however, that raw materials should be consumed only in relation to the possibility of replacing them.

Foresters will recognize this as another way of applying the principle of sustained yield to all resources. Deploring the idea that nations "have always been more interested in sawmills than seedlings", the author emphasizes that the forester's contribution to the problem should be to establish sustained yield at an increasingly high level by improving growth rates through good silviculture. The application to non-renewable resources may be difficult in that serious economic adjustments may be necessary; but this can be done, the author believes, under American conditions on a voluntary basis through adjusting consumption to supply by carefully differentiating between wants and needs. Foresters will welcome his advocacy of land use planning through the close co-operation of technologists and governmental policy makers.

FRESH WATER FROM THE OCEAN. Cecil B. Ellis. pp. 217. Ronald Press Company. New York. 1954. U.S. $5.00.

This readily understandable book on a complex subject will be of interest to research workers in forestry and agriculture; it is an example of systematic analysis of the practical possibilities of drawing fresh water from the ocean which could bring about a complete change in the way of life of inhabitants of arid regions. The staff of Nuclear Development Associates Inc. have come to the conclusion that 1,000 million gallons (3,785 million liters) per day would irrigate an area of land about 18 square miles (4,660 ha.) at a cost of not more than 30 cents per thousand gallons (3,785 liters) at a cheap power location.

The book concludes that for certain cities and industries the general price level of 30 cents per thousand gallons would be within financial reach where no cheaper source of fresh water was available. For large irrigation projects, however, where the costs are to be borne by the products of the soil alone, it is doubtful whether any extraction method so far suggested is suitable from an economic standpoint, and much further research is needed to develop cheaper methods.

Roma, 1954 - S.p.A. Tipografica Castaldi, Via Casilina, 49

THE OXFORD SYSTEM OF DECIMAL CLASSIFICATION FOR FORESTRY

Authorized English Version

Prepared by the Joint FAO/IUFRO Committee on Bibliography in collaboration with the Commonwealth Forestry Bureau, Oxford, England, and recommended by the Conference of FAO and the Congress of the International Union of Forest Research Organizations for adoption by member countries.

Published by the Commonwealth Agricultural Bureaux on behalf of IUFRO.

Copies may be obtained on direct application to:

Commonwealth Agricultural Bureaux,

Central Sales Branch,

Farnham Royal,

England.

Price: 10s. 0d. per copy, post free; interleaved copies 12s. 6d., post free.

Two New Forestry Publications

LES EUCALYPTUS DANS LES REBOISEMENTS

(EUCALYPTS FOR PLANTING)

FAO Forestry and Forest Products Study No. 11

One of the most versatile tree groups for the creation of new forests has been the genus *Eucalyptus*. The present monograph by a recognised authority sums up for foresters the highlights of world experience to date with this important genus. It summarizes available material on botanical and sylvical characteristics, nursery and planting methods, and technological properties and uses.

English Edition in Preparation *Price*: $3.50, 17s. 6d.

DU CHOIX DE TRACTEURS POUR LE DÉBARDAGE

(TRACTORS FOR LOGGING)

FAO Forestry Development Paper No. 1

The aim of this paper, prepared as part of the work of the Joint Working Party on Logging Techniques and Training of Forest Workers of FAO and ECE is to give guidance in the choice of tractor types particularly for the extraction and hauling of timber under various conditions. Calculations for ground conditions and gradient, and methods for determining cost prices per unit are included.

Price: $2.00, 10s. 0d.

FAO's FORESTRY STATISTICAL SERVICES

EUROPEAN TIMBER TRENDS AND PROSPECTS, 1953. 315 pp. In English and French. $3.05, 25s.

This joint FAO/ECE study immediately ran into a second edition when it was published in the spring of 1953 and is still the basic study for all those interested in forestry policy in Europe for the next decade.

YEARBOOK OF FOREST PRODUCTS STATISTICS, 1953. 1954, 153 pp., (Trilingual) $2.50, 12s. 6d.

This brings last year's issue up to date, and the layout of the tables has been improved to present the facts with greater clarity.

TIMBER STATISTICS FOR THE YEARS 1946-47, 1948, 40 pp., (Bilingual). Prepared jointly by FAO and the Economic Commission for Europe. Available only from Sales Section, United Nations, Geneva, Switzerland. $0.50, 2s. 6d.

TIMBER STATISTICS. Quarterly Bulletin, 1948-1950 (to date), 44 pp., (Bilingual). Prepared jointly by FAO and the Economic Commission for Europe. Available only from Sales Section, United Nations, Geneva, Switzerland. $0.50, 2s. 6d. Annual subscription $2.00 10s.

Contains timber market reports for most of the countries of Europe.

SALES AGENTS FOR FAO PUBLICATIONS

Argentina: Editorial Sudamericana, S. A., Alsina 500, Buenos Aires; **Australia**: H. A. Goddard Pty. Ltd., 255ª George Street, Sydney; **Austria**: Wilhelm Frick Verlag, Graben 27, Vienna 1; **Belgium**: Agence et Messageries de la Presse, 14-22 rue du Persil, Brussels; **Brazil**: Livraria Agir, Rua Mexico 98-B, Rio de Janeiro; **Burma**: (Wholesale) Orient Longmans Ltd., 17 Chittaranjan Avenue, Calcutta 13, India; **Canada**: The Ryerson Press, 299 Queen Street West, Toronto 2, Ontario; Periodica, 5112, Ave. Papineau, Montreal 34; **Ceylon**: (Wholesale) Orient Longmans Ltd., 17 Chittaranjan Avenue, Calcutta 13, India; **Colombia**: "Agricultura Tropical," Carrera 13, No. 13-17, Bogotá; **Costa Rica**: Trejos Hermanos, Apartado 1313, San José; **Cuba**: René de Smedt, La Casa Belga, O'Reilly, Havana; **Denmark**: Ejnar Munksgaard, Norregade 6, Copenhagen K; **Ecuador**: " La Hacienda", Malecón 710-711 y Roca, Guayaquil; **Egypt**: Librairie de la Renaissance d'Egypte, 9 Sh. Adly Pasha, Cairo; **El Salvador**: Manuel Navas y Cía., 1ª Avenida Sur 35, San Salvador; **Finland**: Akateeminen Kirjakauppa, 2 Keskuskatu, Helsinki; **France**: Les Editions A. Pedone, 13 rue Soufflot, Paris 5e; **Germany**: Paul Parey, Lindenstrasse 44-47, Berlin SW68; **Greece**: " Eleftheroudakis " Constitution Square, Athens; **Guatemala**: Goubaud y Cia. Ltda, 5ª Avenida Sur No. 28, Guatemala; **Haiti**: Max Bouchereau, Librairie " A la Caravelle ", B. P. 111 B, Port-au-Prince; **Iceland**: Halldor Jonsson, Mjostraeti 2, Reykjavik; Jonsson & Juliusson, Garöastraeti 2, Reykjavik; **India**: Orient Longmans, Ltd., 17, Chittaranjan Avenue, Calcutta 13; Nicol Road, Ballard Estate, Bombay; 36A, Mount Road, Madras 2; 17/60 Sanyasiraju Street, Gandhinagar, Vijayawada 2; Kanson House, Delhi-Ajmeri Gate Scheme, New Delhi; Retail Agent: The Oxford Book and Stationery Co., Scindia House, New Delhi; **Ireland**: The Controller, Stationery Office, Dublin; **Israel**: Blumstein's Bookstore Ltd., P. O. Box 4154, Tel Aviv; **Italy**: Libreria Internazionale Ulrico Hoepli, Galleria, Piazza Colonna, Rome; Libreria Internazionale Dr. Romano Romani, Via Meravigli 16, Milan; **Japan**: Maruzen Company Ltd., Tori-Nichome 6, Nihonbashi, Tokyo; **Lebanon**: Librairie Universelle, Avenue des Français, Beirut; **Mexico**: Manuel Gómez Pezuela e Hijo, Donceles 12, Mexico, D. F.; **Netherlands**: N. V. Martinus Nijhoff, Lange Voorhout 9, The Hague; **New Zealand**: Whitcombe & Tombs Ltd., Auckland, Wellington, Hamilton, Christchurch, Dunedin, Invercargill, Timaru; **Norway**: Johan Grundt Tanum Forlag, Kr. Augustst̊g. 7ª, Oslo; **Pakistan**: East: Farcos' Publications, 2 Inglis Road, P.O. Box 13, Ramna Dacca; West: Ferozsens, 60 The Mall, Lahore; **Peru**: Libreria Internacional del Perú, S. A., Casilla 1417, Lima; **Philippines**: D. P. Pérez Company, 169 Riverside, San Juan, Rizal; **Portugal**: Livraria Bertrand, S.A.R.L., 73-75 rua Garrett, Lisbon; **Spain**: Aguilar, S. A. Ediciones, Juan Bravo 38, Madrid, José Bosch Librero, Ronda Universidad 11, Barcelona; **Sweden**: C. E. Fritze, Fredsgatan 2, Stockholm 16; Gumperts AB, Göteborg; Henrik Lindstahls, Bokhandel, Odengatan 22, Stockholm; **Switzerland**: Librairie Payot, S.A., Lausanne and Geneva; Hans Raunhardt, Kirchgasse 17, Zurich 1; **Syria**: Librairie Universelle, Avenue Fouad 1er, B. P. 336, Damascus; **Taiwan**: The World Book Company Ltd. 99 Chungking, South Road, Section 1, Taipei; **Thailand**: Requests for FAO publications should be addressed to: FAO Regional Office for Asia and the Far East, Maliwan Mansion, Bangkok; **Turkey**: Librairie Hachette, 469 Istiklal Caddesi, Beyoglu, Istanbul; **Union of South Africa**: Van Schaik's Bookstore, Pty. Ltd., P.O. Box 724, Pretoria; **United Kingdom**: H. M. Stationery Office, P. O. Box 569, London S.E. 1.; **United States of America**: Columbia University Press, International Documents Service, 2960 Broadway, New York 27, N. Y.; **Uruguay**: Héctor d'Elia, Oficina de Representación de Editoriales, 18 de Julio 1333, Montevideo; **Venezuela**: Suma, S. A., Sabana Grande 102, " El Recreo ", Caracas; **Yugoslavia**: Drzavno Preduzece, Jugoslovenska Knjiga, Belgrade.

Requests from countries where sales agents have not yet been appointed may be sent to: FAO Documents Sales Service, Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy.